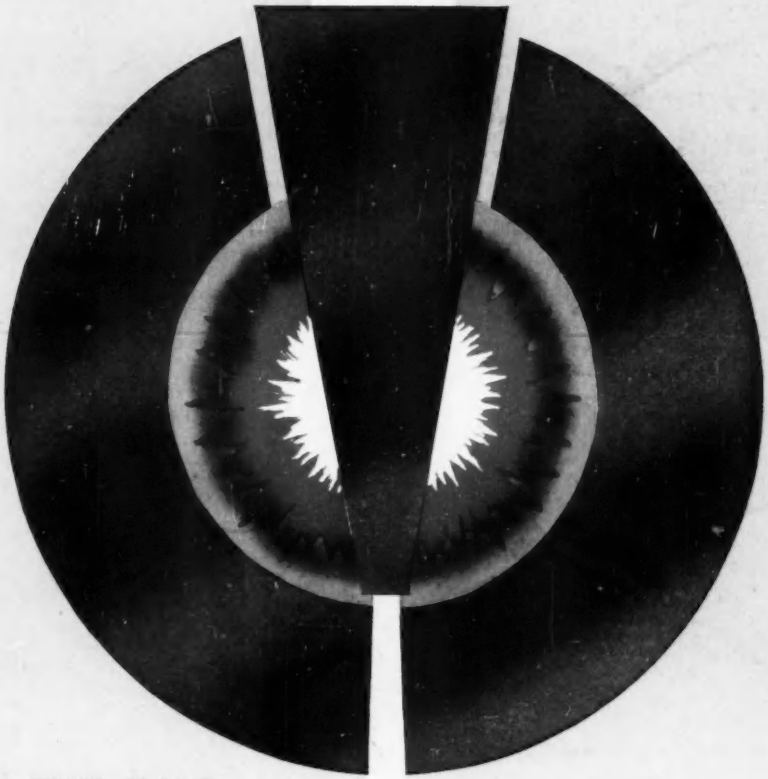
AUTOMOTIVE INDUSTRIES

DECEMBER 15, 1949



IN THIS ISSUE

Design of Studebaker's Automatic Transmission
Latest Applications of Heliarc Welding
1950 Oldsmobile Improvements
Greater Coil Spring Output Using Automation
Auxiliary Gas Turbines for Aircraft

Complete Table of Contents, Page 3

A CHILTON PUBLICATION

What is the

RETIREMENT AGE

of a Machine Tool?

The real answer depends, not on the old machine... but on THE NEW ONE!

A machine that you purchased 5, 10, or even 15 years ago may still be in excellent condition today—still able to do its job just about as well as the day it was installed. Then why consider retiring it?

For the answer, look at the new machine that should replace it. Will the new one do the job faster—better—at lower cost per part? Retirement is then a matter of simple arithmetic. The new line of Heald machines, for example, incorporates so many new ideas and design improvements that, by comparison, most older machines are no longer economical to operate. And when a machine starts costing you money—that's the time for retirement!

If you're in doubt about the retirement age of any of your precision finishing machines, why not ask the advice of your nearest Heald representative? He will be glad to help you.

HEALD

PRECISION INTERNAL AND SURFACE GRINDERS

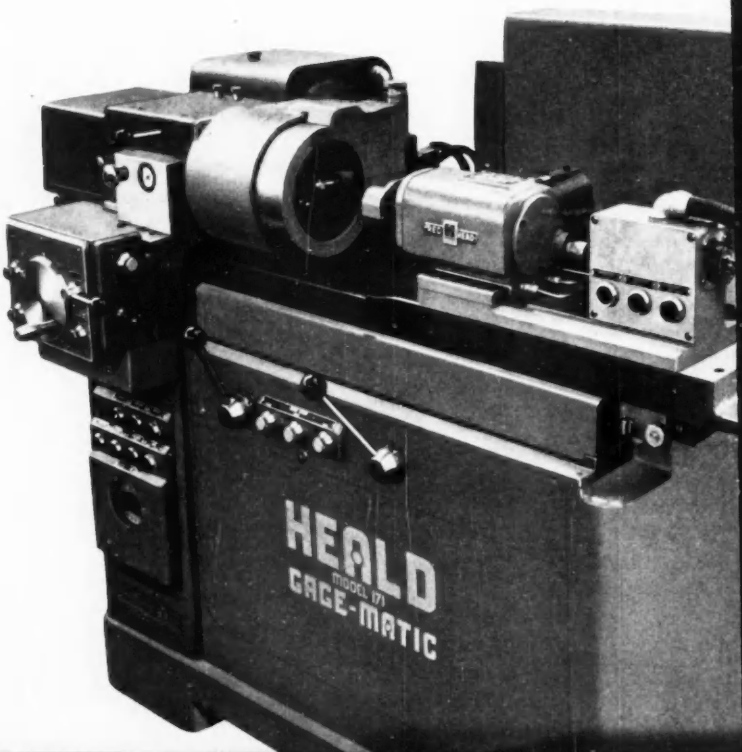
PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY
Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit
Indianapolis • Lansing • New York

HERE'S A TYPICAL EXAMPLE:

This New Heald Model 171 Chuck-Type Internal is now doing a job where the production time for rough and finish grinding of steel sleeves has been reduced from 405 seconds to 165 seconds—a saving of 239 seconds per part. What's more, the new machine gives even better finish, better size, better accuracy than the equipment which it replaced. And it's much easier to operate, with high-speed automatic cycle and hi-frequency wheelhead. This new machine has proved a highly profitable investment—one that could not have been postponed longer without serious loss to the user.



JANUARY 29, 1947 MILWAUKEE JOURNAL PHOTO

REPEAT PERFORMANCE?

● It won't be by popular request, but *The Big Snow* may be booked for a return engagement in your city this winter. And . . . are you all set for it?

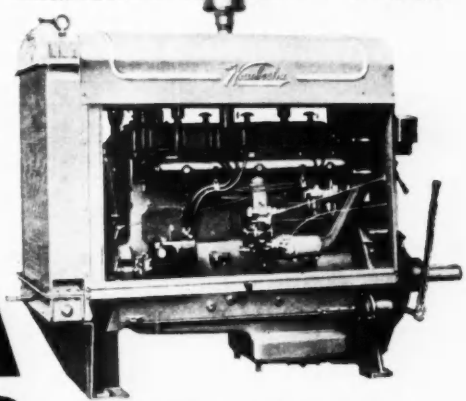
With Waukesha-powered snow plows you *will* be. Then you can put the *open for business* sign on streets and highways, and keep 'em that way.

You'll get action—look at this Model 72 Snow King Rotary Plow. It's mounted on the rear of a truck and independently powered by a Waukesha 145-GKU. The plow's blade pierces and feeds the snow to the Waukesha-powered rotor, which cuts and discharges the snow by centrifugal force straight up, and the deflecting chute throws it to either side, or in opposite directions, off the highway or into waiting trucks.

Find out how Waukesha builds the utmost in power output and dependability into this splendid six. Get Bulletin 1186.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.

NEW YORK TULSA LOS ANGELES



WAUKESHA 145-GKU Power Unit— six cylinders, 5¼-in. x 6-in., 779 cu. in. displacement, 167 maximum horsepower.

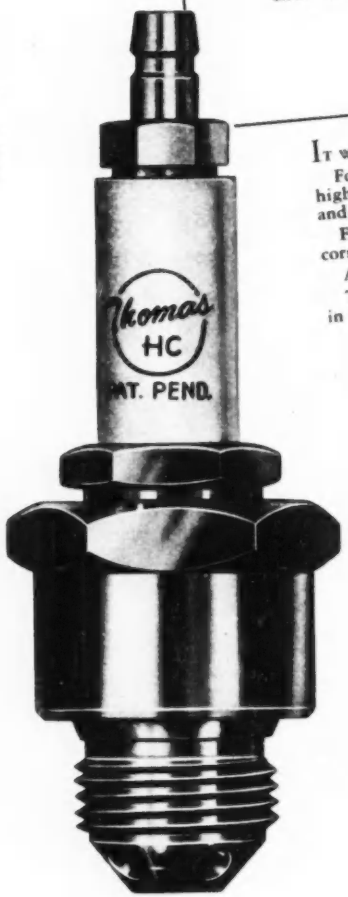
WAUKESHA ENGINES

How they made a better spark plug...

MEMO TO DESIGN DEPARTMENT:

We want a high-quality rustproof plug that can't foul -- for automotive, aircraft, and marine use.

The Thomas Automotive Products Mfg. Co.



IT WASN'T an easy assignment!

For automotive and stationary engine use, the new Thomas high-compression plug had to be long-lasting, easy to maintain, and inexpensive.

For aircraft use, the plugs had to be non-fouling, corrosion-resistant, positive firing, shatter-proof.

And for marine use, the plugs had to be fully rustproof.

Thomas Co. engineers solved these various design problems in the following manner:

Corrosion-resistance. Entire body of the Thomas high-compression spark plug is made of rustless, high-strength "R"* Monel. The nickel alloy electrode is also rustless, strong, corrosion-resistant.

Thermal Durability. Both "R" Monel and Duranickel have excellent resistance to hot corrosives, as well as good hot strength.

Non-fouling. The Thomas high-compression plug is equipped with a baffle designed to literally "blow" the oil away from the electrode during the firing cycle.

Shatterproofing. The insulator is made of aluminum oxide "synthetic sapphire in bond" which gives high impact strength.

Ease of maintenance. The plug may be completely disassembled for cleaning. Gap adjustment is by means of a slotted center electrode and a hex-nut at the top of the plug.

Positive firing. Five separate points of firing are made possible by the exclusive Thomas "jet firing" baffle design.

On the basis of continuing tests in heavy trucking service, Thomas high-compression plugs have already lasted more than 50,000 miles.

Increased plug efficiency results in a gas saving of approximately 10%, reports the Thomas Co.

If you would like to try these improved spark plugs, write directly to the Thomas Automotive Products Manufacturing Co. of 216 Seventh St., Rockford, Ill.

Remember, too—our Technical Service Department is always ready to help you solve your metal-selection and fabrication problems.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

*Reg. U. S. Pat. Off.

EMBLEM OF SERVICE
NICKEL INCO TRADE MARK **ALLOYS**

MONEL* • "K"* MONEL • "R"* MONEL • "KR" MONEL • NICKEL • "D"* NICKEL
"L"* NICKEL • INCONEL* • DURANICKEL* • PERMANICKEL* • INCONEL "X"*

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

December 15, 1949 Vol. 101, No. 12

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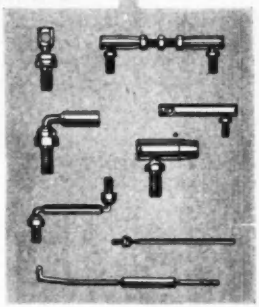
TOUREK

BALL JOINTS AND SCREW MACHINE PRODUCTS

1

BALL JOINTS

The use of Tourek Ball Joints has helped many manufacturers to improve product performance, simplify design and reduce costs. These benefits are yours too when you specify Tourek!



Whether your specifications call for standard or special Ball Joints, you can depend upon Tourek performance, delivery and prices!

Send for your copy of Tourek's 16-page Ball Joint Catalog. It fully describes 12 standard types in 54 sizes (carried in stock), and has data on special types as well.

2

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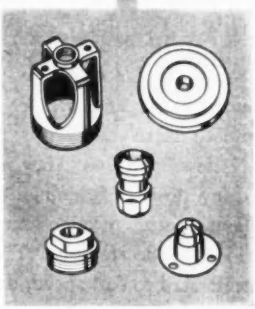
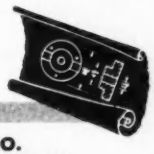
Tourek's modern plant — from the tool room to the batteries of giant 6-spindle automatics — is geared to turn out your screw machine product needs in any size up to 2⅝", from any type of metal. Twenty-eight years of production experience back up every job which Tourek undertakes.



For prompt quotation on your screw machine products requirements, simply send blueprint or sample.



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MAKERS OF QUALITY SCREW MACHINE PRODUCTS

ESTABLISHED 1920
TOUREK
FAMOUS BALL JOINTS

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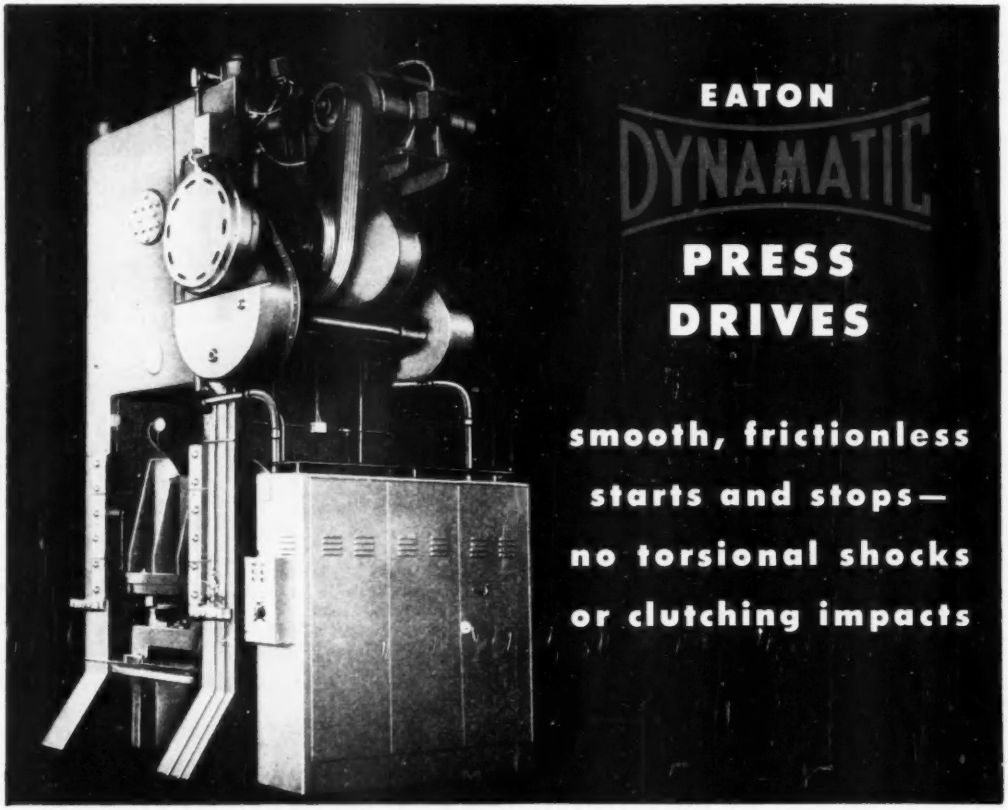

Dynamatic Electric Slip Couplings applied as punch press and welder press drives provide smooth starts and stops; better safety control; noiseless operation. They permit stopping of ram in any position, eliminate friction or jaw clutch maintenance; provide extremely rapid acceleration and deceleration. The ram can be started, accelerated to full speed, driven by ample torque, and then stopped at the top of the stroke within 5 or 10 degrees. Response to driving and braking effect is practically instantaneous. Inching is smooth, quiet, under precise control, while motor continues to run at full speed. Electronic control provides reliable ram speed and instantly available full torque. A selector switch makes available non-repeat single stroke, or continuous run operation.

The absence of pins, jaws, and discs, and the elimination of torsional shocks and clutching impacts make for long life and reduce maintenance to a minimum. High clutching speeds result in increased production.

Dynamatic press drives are available through leading press manufacturers. Write for illustrated literature.

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SOME OF THE RESOURCES BEHIND A Unique Policy
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Visual inspection of piston rings
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MUSKEGON Piston Rings

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"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

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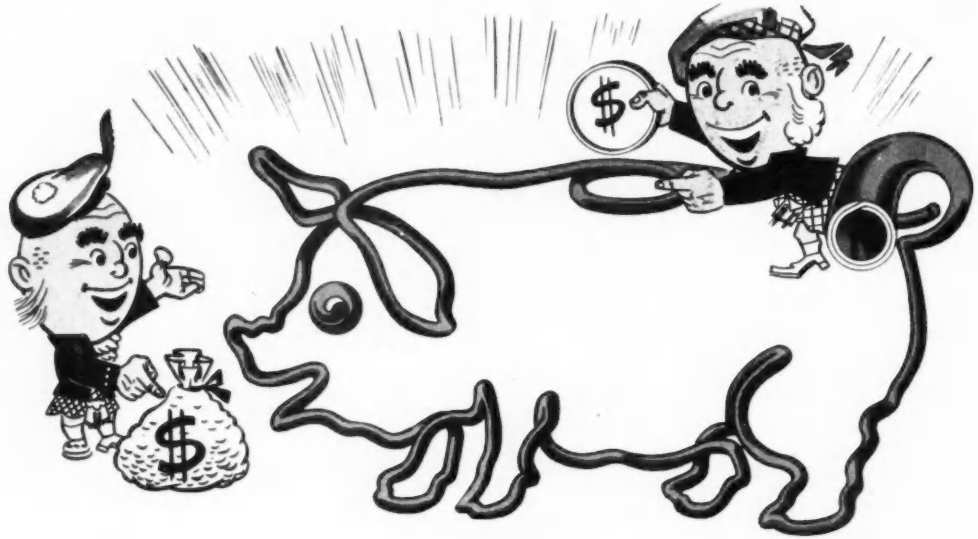

Cash in on Bundyweld for better automotive tubing

You cash in on improved performance when you pick Bundyweld® Steel Tubing for your automotive needs. And here's why!

Bundyweld is made by a patented process . . . double-walled from a single strip, copper-brazed at all points of wall contact . . . for extra-strong tubing that's leakproof and resistant to vibration fatigue.

Lightweight and easily fabricated, Bundyweld Steel Tubing is amazingly ductile, and can be bent without fear of its collapsing or weakening structurally. With all its advantages, the cost of this unique tubing is surprisingly low.

Automotive manufacturers have found Bundyweld to be ideal in withstanding failure from vibration, shock and pressure in fuel lines, pressure lines and hydraulic brake line systems . . . *and that's why you'll find it in 95% of all cars made today!*

Why not check on this outstanding tubing, if you're not already using it? Contact your near-by Bundy distributor among those listed below, or write direct to: *Bundy Tubing Company, Detroit 14, Michigan.*

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ENGINEERED TO YOUR EXPECTATIONS

*REG. U. S. PAT. OFF. ®

WHY BUNDYWELD IS BETTER TUBING

1 Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

2 This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance, cold-rolled strip.

3 Next, a heating process fuses bonding metal to basic metal. Cooled, the double walls have become a strong ductile tube, free from scale, held to close dimensions.

4 Bundyweld comes in standard sizes, up to 5/8" O.D., in steel (copper or tin coated), Monel or nickel. For tubing of other sizes or metals, call or write Bundy.

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The 1950 "Specs" Call for More HYATTS

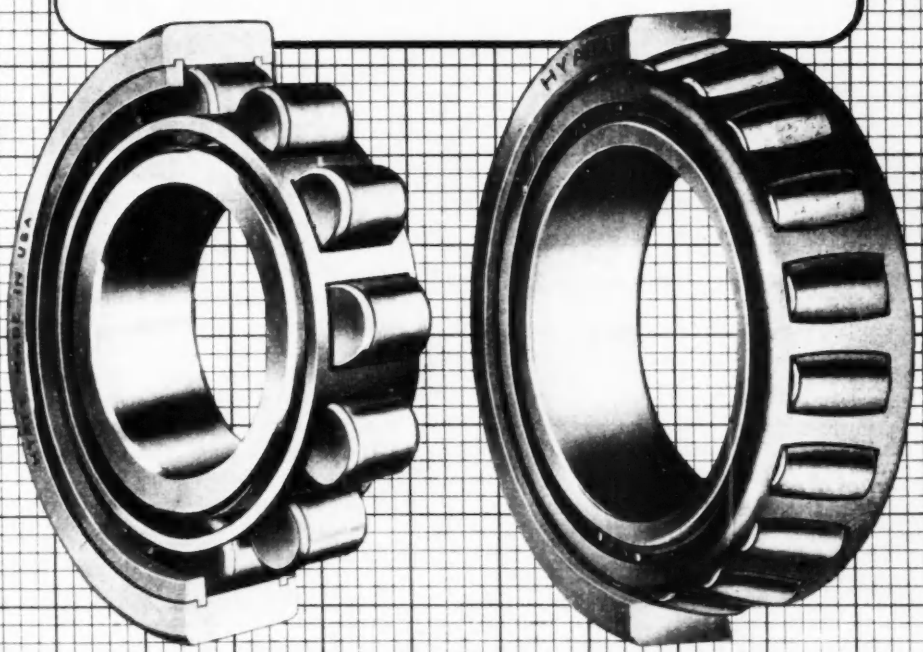
Checking up on the 1950 lines, we find *more* Hyatt Roller Bearings in *more* positions, in *more* cars, trucks and buses than ever before.

Ever since "the nineties," when Hyatt made its first roller bearings for the automotive industry, Hyatts have been the preferred roller bearings—proof of performance.

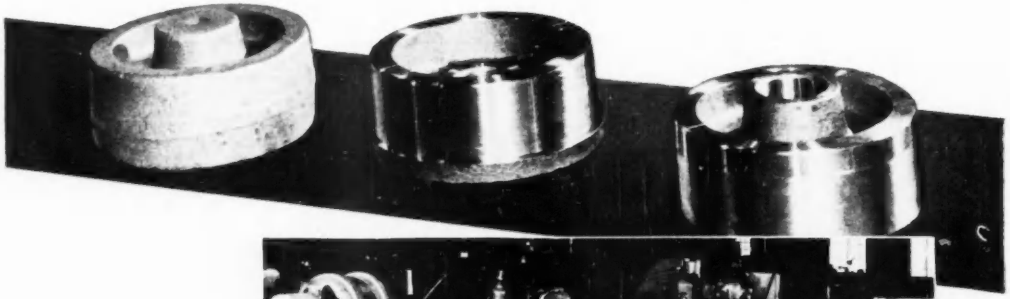
Design engineers know from past experience that Hyatt Roller Bearings, whatever the type or size, are designed and made to do the job to which they are applied.

And many of the machines, as well as material handling equipment, used in automotive production are likewise Hyatt-equipped for smoother and more efficient operation.

You are invited to make use of Hyatt engineering service when you need help with bearing applications. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Detroit, Michigan.

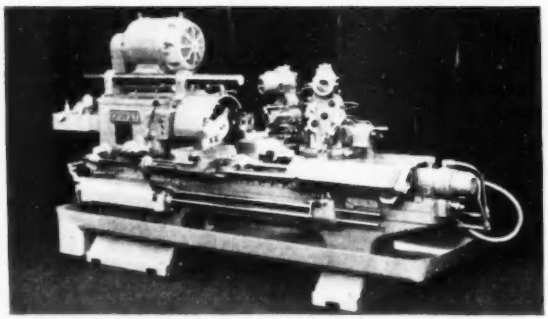


HYATT ROLLER BEARINGS



from
41.9 Minutes
down
to
15 Minutes

That's Productivity with the GISHOLT FASTERMATIC



The Gisholt Fastermatics are built in three sizes ranging from 21" to 36½" swing over bed.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

The cost of machining these gear blanks at the Falk Corp. took a sharp drop when the Fastermatics took over. Time was cut nearly two-thirds. Moreover, human errors were eliminated, thanks to Fastermatic's ability to hold close tolerances.

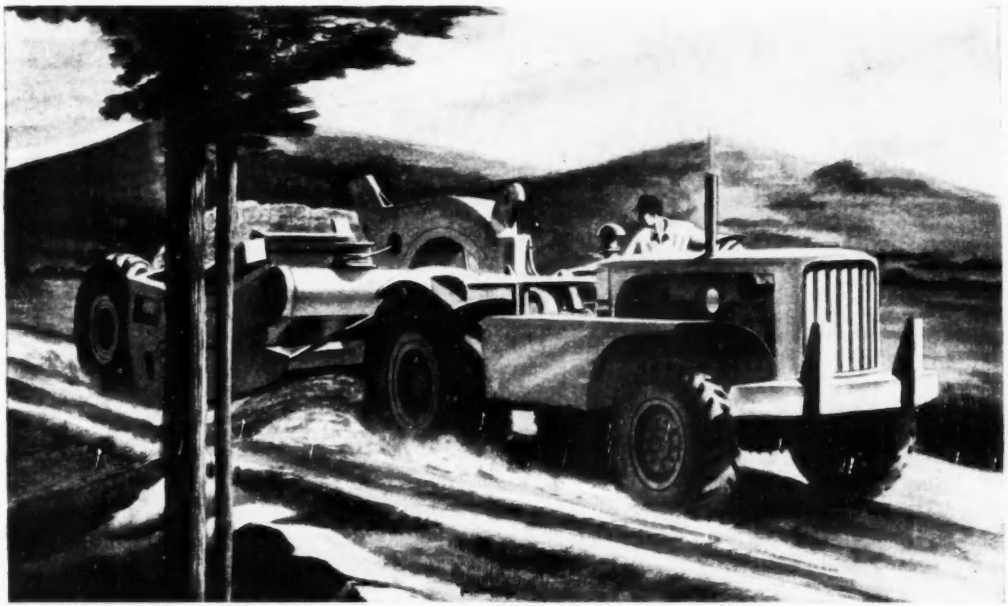
One operator tends 2 Fastermatics and a honing machine. Simple tooling makes it possible to handle 9 different sizes of gear blanks.

These modern automatic turret lathes enable you to handle a larger number of operations in one chucking—and cut costs to the bone on a wide variety of work. Ask for facts about them.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

WHEN THE JOB IS *Tough*



ROSS BRINGS EASE . . . AND ECONOMY

HERE's an unusually difficult job of steering . . . but Ross handles it, as always, with ease, safety and economy . . . Whatever the steering problem, under any condition of road, load, or weather, Ross performs to your complete satisfaction.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

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Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

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JUST A FEW USES:

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- Isolating vibration
- Controlling temperature
- Reducing weight
- Excluding dust, grit, etc.
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Felt's versatility suggests unlimited applications for design needs. Western Felt is available in any form—rolls, sheets, custom cut parts. Felt can be treated chemically to meet practically any requirement.

Western Felt, processed from wool-soft to rock-hard does not fray, ravel or lose its shape. It is cut to remarkably close tolerances and its uniformity is unsurpassed. Felt can be supplied to meet Army, Navy and S.A.E. specifications.

Why not check Western Felt's superior qualities and possible uses. Our engineers will gladly cooperate.

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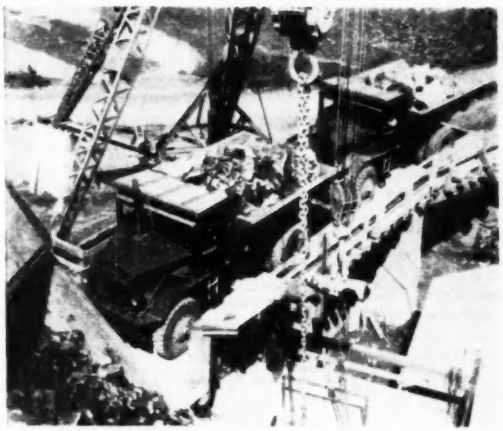
LARGEST INDEPENDENT MANUFACTURERS AND CUTTERS OF WOOL, HAIR AND JUTE FELTS

"So smooth I wouldn't know it was there..."

. . . that's what Edgar Bishop says about the Fuller Transmission in his new Euclid Rockhauler.

Five Euclid Rockhaulers handle 300 tons an hour over the steep haul road from pit to crusher.

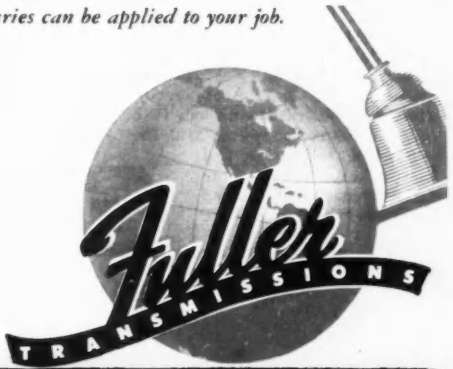


Two of the General Crushed Stone Company's haulers waiting to unload at the crusher.

The five Euclid Rockhaulers at The General Crushed Stone Company, Glen Mills, Pa., are equipped with Fuller 5A920 Transmissions. Hauling heavy loads up steep grades, drivers like Edgar Bishop appreciate the *extra* smoothness in quiet-running, easy-shifting Fuller Transmissions.

Whatever the operating conditions—heavy loads on steep grades . . . empty runs on level roads—Fuller Transmissions and Auxiliaries have the wide range of gear ratios that lets your trucks take them in stride.

Write for your copy of the 12-page catalog that shows you how Fuller Transmissions and Auxiliaries can be applied to your job.

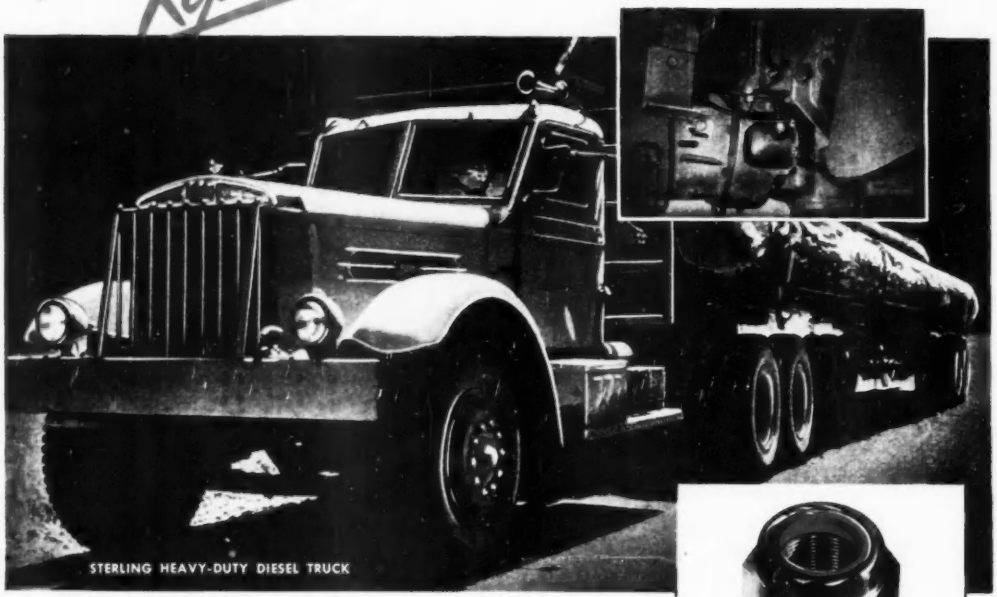


FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

Castellated Nuts Replaced—

ELASTIC STOP NUTS
SAVE PRODUCTION TIME...MONEY



STERLING HEAVY-DUTY DIESEL TRUCK

The Red Elastic Collar Keeps Production Costs DOWN... *Production* UP!

On the engine rear support bolts of the Sterling Heavy-Duty Diesel Trucks, Elastic Stop Nuts have replaced castel nuts and speeded up production in a typical example of assembly line fastener simplification.

Sterling found that Elastic Stop Nuts provided the necessary positive fastening security at lower cost. Why? Because Elastic Stop Nuts lock in position anywhere on a bolt or stud—and only ONE adjustment is necessary—the first. The self-locking, self-sealing Red Elastic Collar provided the "grip-dependability" Sterling needed to keep their precise settings permanent. No amount of vibration, impact or heavy field duty can shake Elastic Stop Nuts loose.

And all Elastic Stop Nuts keep bolt and nut threads rust-free . . seal against liquid seepage along bolt threads . . . do not damage the threads . . . and are re-usable.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Write: Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in many principal cities.

ESNA

THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

Threadless and permanently elastic, it provides these 4 outstanding features:

1. **Protects against nuts loosening due to VIBRATION**
2. **Keeps locking threads CORROSION FREE**
3. **Provides for accurate BOLT LOADING**
4. **Seals against LIQUID LEAKAGE along the bolt threads**

ELASTIC STOP NUTS

OVER 450 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK

Houdaille-Hershey makes better shock absorbers *at lower cost* with J&L free-machining ELECTRICWELD STEEL TUBING

J&L STEEL

(*Above*) Multiple spindle broaching machine at the Houde Engineering Division of Houdaille-Hershey Corporation that machines the inside diameter of J&L ELECTRICWELD Tubing to 1/1000" tolerance.

(*Left*) Aeroplane-type shock absorbers on the production line at the Houde Engineering Division, Houdaille-Hershey Corporation, Buffalo, N. Y.

When production runs into thousands of units daily, every possible saving in material and labor costs in each shock absorber is vital to efficient manufacturing. Houdaille-Hershey Corporation, Buffalo, New York, reduced manufacturing costs when it changed from more expensive cold-drawn tubing to J&L *free-machining* ELECTRICWELD Tubing for the main cylinder of precision-built hydraulic shock absorbers.

This special J&L tubing is made from *resulphurized, open-hearth steel.* The resulphurizing imparts the desired free-machining quality required by Houdaille-Hershey for broaching the interior surface of the cylinders with uniform precision to a tolerance of 1 1000 of an inch.

Because J&L controls every step in the manufacture of ELECTRICWELD Tubing from raw materials to finished product, it can give you the exact grade of steel you need to help you make a better product, faster, and at a lower cost.

If you use tubing in the manufacture of your product investigate J&L ELECTRICWELD Tubing. Write today for your copy of our new booklet: "J&L ELECTRICWELD TUBING *for more strength with less weight.*"

Jones & Laughlin Steel Corporation
430 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send me your booklet: "J&L ELECTRICWELD TUBING *for more strength with less weight.*"

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Bendix Products Division

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

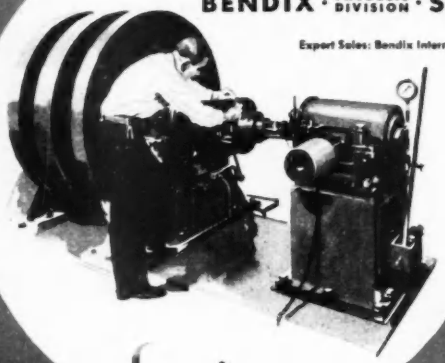
BRAKING HEADQUARTERS

FOR THE AUTOMOTIVE INDUSTRY!

No industry in all the world has a more consistent record of product progress than the automotive industry. The fact that for more than a quarter of a century the automotive industry has considered Bendix Products Division as braking headquarters, is indeed a tribute to Bendix engineering ingenuity and production skill. To continue to merit this enviable reputation of recognized leadership is at all times, the guiding policy in the design and manufacture of Bendix Brakes. Be assured Bendix Products Division is not content to rest on its past achievements but is eager to meet the challenge of tomorrow's vehicles with even smoother, safer brakes for every purpose.

BENDIX · PRODUCTS DIVISION · SOUTH BEND

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York



BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES

*REG. U. S. PAT. OFF.

AUTOMOTIVE INDUSTRIES

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AUTOMOTIVE INDUSTRIES
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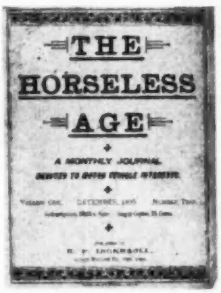
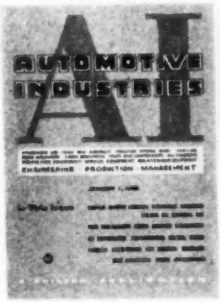
1895



1950



Continuing emphasis on editorial excellence and on advancement in graphic presentation, beginning with the next issue (January 1) AUTOMOTIVE INDUSTRIES will appear with a new cover design, which is shown above, and will introduce color throughout its editorial section. The new cover will be printed in special color combinations—green and black for the First of the Month issue and orange and black for the Fifteenth of the Month issue. Of interest is that the first cover design of HORSELESS AGE, founded in 1895 and a predecessor of AUTOMOTIVE INDUSTRIES, was printed in red and blue.—Ed.

High Spots of This Issue

Modern cars and the problems of off-street parking facilities—discussed by the president of Ramp Buildings Corp., **page 25** . . . Fifth installment of AI's interest-packed series on Automatic Transmissions—divulging details on the 1950 Studebaker transmission, **page 26** . . . Features of 1950 Oldsmobiles, **page 31** . . . How the complexities of scheduling car production are handled at Chrysler, **page 32** . . . Use of auxiliary gas turbines for pneumatic power in aircraft, **page 36** . . . Latest applications of heliarc welding, **page 38** . . . How automation is expediting coil spring production at Ford's Hamilton plant, **page 42** . . . Twenty-four New Product items, **page 45** . . . And other High Spots such as hardening and balancing parts for IHC's Silver Diamond engine, **page 41.**

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

Can you hear between the notes?

In the hush of Christmas Eve children sing—their reverent voices joyful as they rise and fall with the lamplit notes before their eyes. . . . And if you listen—listen with your mind—you can hear a song *within* their song, the mighty chorus of industry and enterprise that lends our nation's Christmas carols an added theme of thankfulness. . . . In their tiny, tuneful way these carolers remind us of our greatest blessing—the right to share in the American miracle of fruitfulness and freedom. And so we too pause to express our joy and thankfulness for friends and country that make this miracle a reality.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC.

PLANTS: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 101, No. 12 **December 15, 1949**

GM to Give Dealers Extra Discount on Parts Sales

General Motors will modify its replacement parts distributing plan Jan. 1 to provide an overriding, or additional, discount to its dealers on GM parts which they sell at wholesale. The discounts will be available to all dealers who meet the requirements of the plan as outlined by GM when it put the program into effect two years ago. In announcing the modification, GM did not specify the amount of the overriding discount, but did state that it would apply to all of approximately 310,000 parts handled by its car and truck dealers and distributors with the exception of those in the lines carried by United Motors Service, AC Spark Plug and Packard Electric Divisions.

New Nash Small Model to Be Light Car

Reliable reports indicate that when Nash announces its new model small car sometime next spring, it will be the first major automobile company to offer a genuine lightweight model. The car is said to weigh less than 2500 lb, which is very close to the weight of the "600" model when it was announced just before the war, and which since has increased to around 2900 lb. At any rate it will be the first full-sized postwar car to fall into the concept of a small, lightweight automobile. It is believed that the wheelbase will be in the neighborhood of 103 in. Further reports say that the car will seat five persons and will be extremely well styled. It will be of integral body frame construction, the same as used on the larger Nash models, and will use a modification of the six-cyl engine used by Nash in the Statesman model. With its light weight and the economical Statesman engine, the car should give excellent gasoline mileage. It is understood that the car will have a unique front end suspension entirely different from any now being used by any other automobile manufacturer in this country.

Vehicle Production Record Broken in Ten Months

Figures on automobile and truck production for the first ten months of this year show how conclusively the industry has smashed the all-time record which had stood since 1929. The ten-month output of 5,430,093 cars, trucks and buses exceeded the full calendar year record made in 1929 by more than 72,000 units. The record-breaking production averaged 52 vehicles a minute for each working day during the first ten months of this year.

Buick Cuts Price $42.80 on Dynaflow Drive

With Buick following its sister GM divisions in reducing the price of its fully automatic transmission, and Nash and Lincoln also reducing prices on the Hydra-Matic, an interesting problem is posed for manufacturers yet to announce new automatic transmissions. Chevrolet will offer a torque converter as optional equipment shortly after the first of the year, and it has been reported that an effort would be made to keep the price well below that of the Hydra-Matic. The general belief is that Chevrolet will now bring out the transmission at a slightly lower price than might have been the case had the other divisions not reduced it on Hydra-Matic and Dynaflow. Price of Hydra-Matic on Oldsmobile, Pontiac and Nash is now $158.50, and on Cadillac and Lincoln $174.25. The Buick Dynaflow was reduced $42.80 and now lists at $169.20. Studebaker will also shortly announce a torque converter as optional equipment, but the price has not yet been announced. Packard has not yet announced any price adjustment on its Ultramatic drive. The differential in price between Dynaflow and Ultramatic now stands at $55.80.

Willys to Adopt New Engine Next Year

Willys-Overland will have some interesting revelations when it introduces its new line of engines next spring. The company says that while the new power plant will be approximately the same size as the current engine, it will have a higher compression ratio and an appreciable increase in horsepower. It is understood that the six-cyl engine will also have higher compression ratio and greater power output. On tests, both engines have shown considerable improvement in fuel economy. Details are not available for publication, but it is certain that the four-cyl engine will at least be of an unique design. Willys has been experimenting with compression ratios up to as high as 8 to 1, but it is believed the ratio on the engines that will be introduced in the spring will not be higher than 7.5 to 1.

FUTURAMIC FOR FIFTY

Oldsmobile's new Futuramic models for 1950 feature all newly-styled bodies in the Series 98 models (see page 31 for the complete story). Shown here is the four-door sedan of Series 98 which is said to offer greater vision both front and rear through the use of curved glass. Available in five body types, the wheelbase of the new 98 model is 122 in.

1949 Vehicle Production Crowds 6.2 Million

With only two weeks to go and all companies except Kaiser-Frazer back in production after model changes and

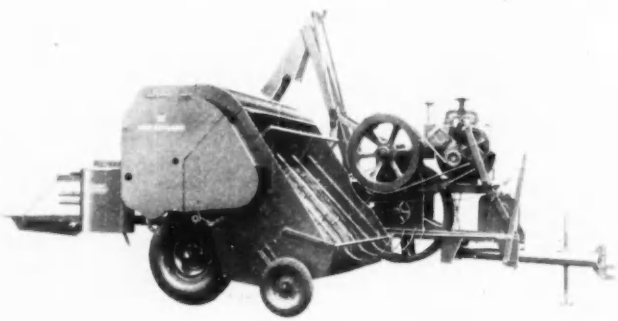
NEWS *of the* AUTOMOTIVE INDUSTRIES

shutdowns for steel shortage, the automobile industry now appears likely to turn out a smashing total of about 6.2 million cars and trucks in U. S. factories this year. Present estimates indicate output of about 5,075,000 passenger cars and 1,125,000 commercial vehicles. Production during the rest of the year will not be at anything like the high rate achieved in September and October, but the industry will be picking up speed after the first of the year. The steel shortage is expected to be felt for at least 60 days although the supply is coming back faster than had been expected earlier. By late February and early March, however, it is thought that schedules will reach or even exceed the levels prevailing during the highest months of 1949.

WAA has taken over physical possession of the plant following a 60-day grace period during which trustees were to sell the Tucker lease or bring about a reorganization of the company. About $2.5 million worth of equipment and other property of the company is still in the plant and is to be removed by the trustees.

British to Stage Car Show in New York Next April

British automobile and motorcycle manufacturers will stage a major postwar automobile show in New York City from April 15 to 23. According to Sir William Welsh, North American representative for the Society of Motor Manufacturers & Traders (Great Britain), nearly a score of British automobile makers and as many motorcycle manufacturers will exhibit their 1950 models. Bicycles, Diesel engines and accessories will also be shown.



BALES IT BETTER

This new 1950 model New Holland Hay baler, made by the New Holland Machine Co., farm machinery subsidiary of the Sperry Corp., features a small pneumatic wheel adjustable to keep the pick-up fingers at the right level from the ground at all times. Of all-steel construction, this baler has a capacity of up to 10 tons an hour, and a baling speed of up to seven bales a minute. Its weight is 4500 lb and it has an overall length of 21 ft 2 in., and an overall width of 8 ft 6 in.

Crosley Motors Planning New Utility Vehicle

Crosley Motors, Inc., is reported to be considering production of a small all-purpose vehicle which would provide not only transportation, but which could also be used for general light farm tractor work such as plowing and cultivating.

Tucker Prospects Vanish As WAA Takes Plant

The Federal government, for all practical purposes, has written finis to any hopes that may still have existed that the Tucker Corp. would eventually get into the automobile production. The

Kaiser-Frazer Considers Use of Willys Engine

It has been confirmed that Kaiser-Frazer has been exploring for many months the possibilities of making a deal with Willys to use that company's line of engines in its projected smaller car. At the time K-F announced that it would build such a small automobile, it announced the car would be powered by a small economical engine that would give surprising performance. The statement is all the more interesting viewed in the light of the recent Willys announcement that next spring it would bring out a new line of engines with higher compression, increased power, and greater economy. Another interesting angle is that Willys has not abandoned its plans for a passenger car which presumably would use the same engine that would be supplied to K-F if the deal is made, with the result that both companies would have small cars with approximately the same power plant. However, there is nothing definite yet in the way of a decision on whether K-F will get the engine.

MEMA Elects Officers for 1950

The Board of Directors of the Motor and Equipment Manufacturers Association have elected the following as the 1950 officers of the association: C. J. Schuepbach, president; G. W. Sherin, vice-president; C. O. Kleinsmith, secretary, and C. P. Brewster, treasurer. The 1950 directors of the MEMA are as follows: J. W. Anderson, the Anderson Co., Gary, Ind.; G. W. Andrews, Andrews Manufacturing Co., St. Louis, Mo.; W. S. Coles, the Shaler Co., Waupun, Wis.; G. H. Goehrig, Blackhawk Manufacturing Co., Milwaukee, Wis.; C. O. Kleinsmith, National Carbon Co., New York City; S. G. Phillips, the Dole Valve Co., Chicago, Ill.; C. J. Schuepbach, Sunnen Products Co., St. Louis, Mo.; G. W. Sherin, E. I. du Pont de Nemours & Co., Wilmington, Del.; R. A. Stranahan, Jr., Champion Spark Plug Co., Toledo, O.; J. M. Wells, Ingersoll-Rand Co., New York City; G. O. Wherley, the Timken Roller Bearing Co., Canton, O., and E. J. Wilcox, J. H. Williams & Co., Buffalo, N. Y.

Gas Turbines for Cars Still Years Away

Although there is still a lot of skepticism among automotive engineers about the use of gas turbines for automotive power for a long time to come, there appears to be just a shade more optimism now than there was a year ago. The fact is that the turbine is not being laughed off as being impossible, and a great deal of experimental and development work is being carried on. GM's Allison Div., for example, is working actively on the turbine program for its aircraft activities and reports indicate that some progress is being made on developments that might lead to eventual use for automobiles and trucks. However, it is still the consensus at GM that the tur-

bine will not compete with the internal combustion engine for many years. On the other hand, George Christopher, president of Packard, predicts that a small and extremely economical gas turbine may be used to power automobiles by 1959. Boeing Aircraft is also doing intensive work on a turbine for truck use, although it is not known how far that particular project has developed to date.

GM New York Car Show to be Held Jan. 19-27

GM has announced that its show in New York City will be held Jan. 19-27. The show will be called the "Mid-Century Motorama." Displaying 38 new models of the company's passenger cars the show will also include many elaborate chassis, engine, and transmission exhibits which have been specially built.

Batelle Reveals More About New Polishing Process

Supplementing earlier newspaper announcements, more specific technical information has been made available to our readers by the Battelle Development Corp., on the chemical polishing process developed recently. This process is applicable only to non-ferrous metals, particularly brass, copper, nickel, and nickel-silver. At the present time Battelle sees no possibility of its use in polishing steel stampings. The polishing solution consists of acetic, nitric, and phosphoric acids which are usually contained in an acid-resisting tank heated by conventional means, and supplemented by the necessary cleaning and rinse tanks. The bath operates most effectively between 100F and 200F. It imparts only a polishing action without noticeable etching of the parts. Treatment takes less than 10 minutes.

Studebaker to Offer Torque Converter in Spring

Studebaker will offer its new torque converter as optional equipment on its Commander and Land Cruiser series during the second quarter of next year, according to H. S. Vance, president. He said that it will be offered on the Champion series later. The company does not plan to get into a lower price field by means of a stripped down model, he added. Mr. Vance revealed that Studebaker has spent $60 million since the end of the war for its program of plant modernization, installation of new equipment, expansion of facilities and introduction of new models. Production this year will hit an all-time high of about 300,000 cars and trucks, and sales will even surpass the previous record made in 1944 when the company was in war work. Current production schedules are 7000 cars and trucks a week.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1949 Ten Months' Totals

MAKE	October 1949	September 1949	October 1948	TEN MONTHS Units 1949	Units 1948	Per Cent of Total 1949	Per Cent of Total 1948
Chevrolet	103,786	108,320	60,259	866,682	589,536	21.59	20.57
Ford	81,449	72,537	59,775	650,450	370,520	16.20	12.93
Plymouth	51,081	50,002	24,229	430,692	278,100	10.73	9.70
Buick	33,145	37,964	20,930	317,355	208,713	7.91	7.28
Pontiac	30,044	30,996	18,367	266,597	190,093	6.64	6.63
Oldsmobile	24,871	25,130	15,408	223,823	152,090	5.56	5.31
Dodge	30,564	29,011	13,343	222,654	173,555	5.55	6.05
Studebaker	21,133	19,871	11,206	164,700	120,068	4.11	4.19
Mercury	19,546	16,866	15,551	148,321	111,202	3.69	3.88
Hudson	7,911	9,640	6,853	118,510	88,004	2.95	3.07
Nash	11,774	9,843	2,110	113,741	89,161	2.83	3.11
Chrysler	13,492	12,081	6,698	108,233	86,187	2.70	3.01
De Soto	10,890	9,249	5,693	85,632	66,704	2.13	2.33
Packard	7,831	8,735	4,645	84,140	63,458	2.10	2.21
Cadillac	13,492	6,882	6,054	67,998	50,531	1.69	1.76
Kaiser	3,353	4,475	9,621	51,891	96,811	1.29	3.38
Lincoln	3,243	3,036	3,578	32,068	24,413	.80	.85
Willys	2,320	2,001	1,295	24,692	17,414	.62	.61
Frazer	587	720	2,114	14,842	50,731	.37	1.77
Crosley	642	678	1,619	9,015	22,995	.22	.80
British Ford	180	242	445	4,885	2,327	.12	.08
Austin	471	221	582	2,737	7,890	.07	.28
All Others	402	347	1,067	4,403	5,800	.11	.20
Total	465,765	459,647	291,442	4,014,061	2,866,303	100.00	100.00

* Based on data from R. L. Polk & Co.

October Car Registrations Continue at High Level

While new passenger car registrations for October did not set a new record, as was thought possible a few weeks ago, they did ring up the second highest total in the postwar period. According to R. L. Polk & Co., 465,765 new cars were registered during October which was second only to the number registered in August of this year—478,556, which incidentally is the all-time high. New truck registrations for October totaled 86,398 which was slightly under the total for September when 89,253 units were registered, but which was 2000 higher than a year ago. Total passenger car sales by Oct. 1 had already passed the previous all-time high of 3.8 million made

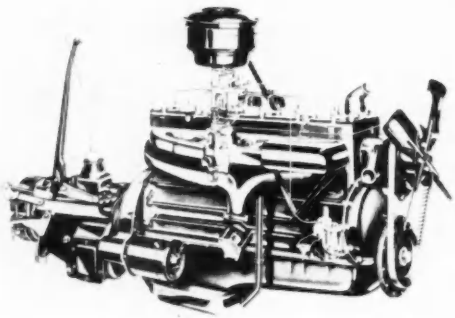
NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1949 Ten Months' Totals

MAKE	October 1949	September 1949	October 1948	TEN MONTHS Units 1949	Units 1948	Per Cent of Total 1949	Per Cent of Total 1948
Chevrolet	29,307	31,084	25,303	290,855	254,723	36.21	28.62
Ford	21,363	21,345	17,641	159,713	199,233	19.88	22.39
Dodge	10,549	10,523	9,809	98,452	97,320	12.25	10.94
International	8,274	8,852	9,211	78,127	110,404	9.72	12.41
G. M. C.	7,149	7,621	7,448	68,976	62,195	8.58	6.99
Studebaker	4,389	4,544	4,258	47,000	42,012	5.85	4.72
Willys-Truck	1,126	1,223	2,374	16,254	22,989	2.02	2.58
Willys-Jeep	877	877	3,408	12,493	43,581	1.55	4.90
White	788	713	922	6,938	9,958	.86	1.12
Mack	707	850	820	5,528	8,659	.69	.97
Diamond T	397	382	780	4,444	9,376	.55	1.05
Reo	354	424	571	3,451	9,573	.43	1.08
Divco	350	337	513	3,106	5,048	.39	.57
Autocar	124	92	232	1,373	2,306	.17	.26
Brockway	169	132	226	1,299	2,511	.16	.28
Federal	68	76	230	1,006	3,688	.13	.41
Crosley	53	39	135	776	2,149	.10	.24
Pontiac	90	70		434		.05	
Kenworth	31	28	47	326	371	.04	.04
F. W. D.	11	42	37	286	727	.04	.08
Sterling	16	18	31	193	372	.02	.04
All Others	206	181	289	2,452	2,673	.31	.31
Total	86,398	89,253	84,284	803,482	889,868	100.00	100.00

* Based on data from R. L. Polk & Co.

NEWS *of the* AUTOMOTIVE INDUSTRIES



SIX WITH FOUR

The largest six-cyl engine ever produced for Ford trucks, this new Ford Rouge 254 six-cyl truck engine with four-speed synchro-silent transmission is now available on series F-6 Ford trucks.

in 1929. It is now believed that total new car registrations this year will be very close to 4.8 million units.

New Ford Six-Cyl Engine for Trucks

The new Ford six-cyl engine (see cut on this page) for series F-6 Ford trucks develops a maximum of 110 hp and 212 lb ft torque. Bore and stroke is 3.5 in. by 4.4 in., and the compression ratio is 6.8 to 1. This engine is equipped with free valves having a special cap design on exhaust valve stems which permits free rotation when opening and closing for self-cleaning and better seating.

The high lift camshaft is of heavy cast alloy iron with large inserted type replaceable bearings, gear driven direct from the crankshaft. A precision machined aluminum timing gear is said to give quiet operation and longer life. The balanced crankshaft is of heavy steel with integral counterweights and has 2.874 in. diameter replaceable type main bearings. Tubular constructed crankpins reportedly provide a high factor of strength with minimum weight. Main and connecting rod bearings are of precision thin shell steel-backed copper lead with babbit overlay. Bearings are of large diameter for lower bearing pressure and are extra-wide.

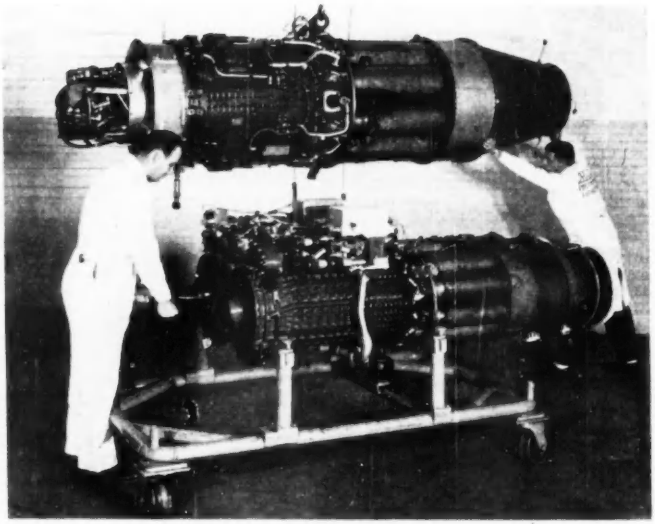
Ford may soon offer a four-speed synchronized gear transmission on its entire truck line from F-6 down. To be standard on the F-6, the transmission would probably be optional equipment on other models.

Allison Develops Powerful New Turbo-Prop

Said to produce more power for its size and weight than any similar engine in the world, the new XT-40 turbo-prop, developed for the U. S. Navy by GM's Allison Div., reportedly produces 5500 hp, and has a weight of 2500 lb. Its specific fuel consumption is 0.63 lb per bhp-hr, and it has a compression ratio of 6.3 to 1. The new XT-40 turbo-prop, identified by Allison as its model 500, is a completely new design, consisting of two axial-flow gas turbine power sections driving a dual-rotation propeller through a common reduction gear. The power sections are connected together so that in effect they form a single unit; however, each power section may be operated independently.

GM Reveals New Casting Technique

General Motors Research has revealed an impressive experimental, metallurgical development of recent origin—the sand casting of gray iron and alloy iron in extremely thin sections and intricate forms. Examples of products made experimentally to demonstrate the technique are torque converter wheels and valve bodies, the latter made in production currently in the form of aluminum die castings. Besides making cast iron parts of such intricate form, the new method makes it possible to produce sections of 1/16-in. thickness held accurately to size and form and with excellent surface finish. Dry sand core assemblies are used for these castings, similar to the cores in the plaster mold method developed at the Bedford foundry which makes the Dynaflow wheels. For this purpose they use Zirconite molding sand, a material having greater refractory value with consequent smoothness of

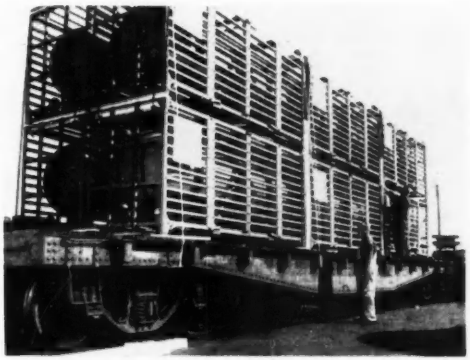


TWO TO ONE

The small size of the new Allison XT40 turbo-prop engine is compared here (foreground) with the J35 turbo-jet engine (which develops 3750 lb thrust, and which weighs 2400 lb) now in production at GM's Allison Div., Indianapolis, Ind. The new engine develops two horsepower per pound of weight, and is reportedly the most powerful propeller-type engine ever cleared for flight. Developed for the Navy, the XT40 will be first used in the XPSY Convair flying boat.

surface in the cast piece. This material, naturally, is more expensive than ordinary core sands.

Molds for the process are so designed as to incorporate a refractory basin into which the molten metal enters from the centrally located gate. The molten metal flows downward into the basin, then outward into the mold. In the parts mentioned above the length of the path from the basin into the ends of the mold is relatively short, thus permitting the proper development of the work piece without defects or porosity.



NOT A JAR IN A CAR

The first carload-lot shipment of 12 jet aircraft engine containers, made by the Firestone Tire and Rubber Co., is shown here. These rubber-cushioned aluminum alloy shipping shells protect the engines from damage by jars and jolts, and are pressurized to prevent the corrosive effects of humid air

Many New Models Slated for Next Six Weeks

Introduction of new models will come with a rush during the next six weeks, and by the end of January all producers with the exception of Kaiser-Frazer will have announced their 1950 offerings. Buick, Oldsmobile and Dodge will make their new model announcements this month, to be followed in January by Chevrolet, Cadillac, Chrysler, DeSoto, Plymouth and Lincoln.

Italy to Hold Car Show Next May

Italy will hold its second postwar automobile show—the 32nd in the series at Turin—from May 4 to 14, 1950. The new exhibition palace, specially erected last year, is now being increased in size to meet the heavy demand for space. It is understood that permission will be granted for foreign exhibition cars to be sold in Italy.

Ford Plans Firmer Grip on Overseas Operations

Under a new reorganization plan, the Ford Motor Co. will gain much firmer control over its European and mid-Eastern operations. Ford will offer to buy Ford Investment Co. of Gurnsey holdings in Ford plants in the Netherlands, Belgium, Spain, Italy, Egypt, Germany and France. The plan requires court approval in England and also approval of stockholders of Ford Motor Co., Ltd., Daghenham, England.

Ford Appoints New Head of Mfg. Engineering

The Ford Motor Co. has announced the appointment of D. J. Davis as director of manufacturing engineering. He succeeds Roy T. Hurley who resigned some time ago to become president of the Curtiss-Wright Corp. Mr. Davis was chief industrial engineer of Avco before joining Ford.

Packard Denies Report of Smaller Car

Reports that Packard will bring out a small or smaller car next year have been denied by Hugh J. Ferry, executive vice-president. He indicated, however, that as future new models are developed, a broader price base may evolve, but how that objective would be accomplished could not be revealed because of competitive reasons. One guess in Detroit is that the company may go back to a six-cyl model, produced now only in taxicabs.

Survey Shows Optimism High Among Equipment Buyers

In a recent national survey conducted by the American Society of Tool Engineers, 80 per cent of the companies reporting said that they planned to buy either more or the same amount of machine tools, machine tool accessories, material handling equipment, and so forth as they did in 1948. Large companies showed the biggest increases in planned purchases. In this group, 79 per cent said their equipment purchases next year will exceed those for 1948, with only seven per cent indicating that they would buy less. Of the medium-sized companies, 55 per cent plan greater outlays for equipment in 1950. In the small company category, 28 per cent said that their equipment buying would exceed that of 1948.

Willys Buys Two Buildings Back from Government

Willys - Overland has repurchased from the WAA two buildings which the company had sold to the government in 1942. The buildings located at the Toledo plant were operated by the company during the war. Purchase price paid by Willys is reported to be about $855,000.

Aetna Ball and Roller Completes Plant Expansion

W. A. Wood, president, Aetna Ball and Roller Bearing Co., Chicago, has announced the completion of the company's expansion program which includes a two-story addition to the former plant and a factory-wide modernization of manufacturing facilities. Mr. Wood stated that the expansion marked the sixth time the company has outgrown its facilities in its 33 year existance. He also stated that the company's line of products would be expanded within the near future as a result of research and engineering developments which have been underway throughout the postwar period.

$984 Million for Machinery and Vehicles Under Marshall Plan

A review of the Marshall Plan at the end of its first 18 months reveals that $984 million in procurement authorizations had been authorized for machinery and vehicles, a majority to be placed with American suppliers. Shipments for the same period amounted to $300 million, all but about $15 million from the U. S. Authorizations and shipments by selected classifications were roughly (paid shipments in parenthesis)—motor vehicles, engines and parts, $143 million ($75 million); aircraft, engines and accessories, $60 million ($19 million); other transportation equipment, $49 million ($30 million); metalworking and machine tools, $160 million ($35 million); tractors, $80 million ($27 million); and other agricul-

NEWS *of the* AUTOMOTIVE INDUSTRIES

HAS A MILLION

The Ford Motor Co.'s new pressed steel plant being built near Buffalo, N. Y., is shown in the above drawing. The one million sq ft. one-story plant will begin producing steel stampings as soon as plant and equipment are ready. About 42 per cent of the stampings required in making Lincoln and Mercury cars and Ford cars and trucks, will be made by Buffalo operations.

tural machinery and equipment, $67 million ($19 million).

GMC Truck & Coach Adds Five Models

GMC Truck will announce five new models when it introduces its 1950 line next month. It will also offer several weight saving items as optional equipment that have been under test for several years. These will include engines of aluminum construction, and alumninum axle housings, auxiliary transmission cases, hubs, brake shoes, and wheels, and lightweight bumpers and frames. Use of these lightweight units makes possible a reduction of 2500 lb on 45,000 GVW model, according to the company.

Ryan Announces New Super Navion

Ryan Aeronautical Co., San Diego, Calif., has announced a new 260-hp Lycoming-powered "Super" Ryan Navion which cruises at 170 mph and climbs 1250 fpm with full load.

Pesco Begins Production in New Plant

Pesco Products Div. of Borg-Warner Corp. has begun production in its new $3 million plant in Cleveland. The new plant has 184,200 sq ft of manufacturing space and 29,000 sq ft of office space.

Mathis Sells Two Plants to General Motors

Under a readjustment of factory layout, the former Mathis factory at Gennevilliers, on the edge of Paris, France, which for a number of years had been rented to General Motors France, has just been sold to the American company.

In addition, an adjoining Mathis factory, occupied by "Mecamat" and used principally for the production of aviation engines, has been purchased by General Motors. These two factories will be used for Frigidaire production and will have no connection with General Motors automobiles. Only buildings have been sold, and no part of the equipment. It is pointed out that there is no connection, either direct or indirect, between Mathis and GM.

The Mathis aviation engine works are being installed at another factory in the Paris neighborhood. The main production activity will be at Strasbourg, where the factory buildings, heavily damaged during the war, are being rebuilt and reequipped. At the present time the Minneapolis Moline tractor is being built at the rate of ten a day. Mathis will shortly go into production at the Strasbourg factory of the six-passenger automobile displayed at the last Paris salon.

New Machine Inspects Pontiac Piston Rings

Pontiac is now gaging piston rings with an automatic inspection machine originally designed for gaging piston rings for aircraft engines. The machine operates at the rate of 2500 rings an hour, and replaces a hand inspection method used formerly which had a rate of 425 rings an hour, and which often was not as accurate as the present machine. The automatic inspector checks the rings for gap and thickness, ejecting perfect rings in one stack and sorting out undersize and oversize rings which are channeled into separate piles. It is believed to be the first such machine to be installed for use in the automobile industry.

1949 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Totals 1949	Totals 1948
Total—Six Months	2,377,945	613,008	3,331	2,994,284	2,488,373
Total—Third Quarter	1,575,124	286,587	1,181	1,862,892	1,349,446
Total—Nine Months	3,953,069	899,595	4,512	4,857,176	3,837,819
October	487,891	84,704	322	572,917	491,803
Total—Ten Months	4,440,960	984,299	4,834	5,430,093	4,329,622

1949 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
Total—Six Months	2,291,023	86,922	536,247	76,761	2,894	437
Total—Third Quarter	1,537,906	37,218	257,903	28,684	1,093	88
Total—Nine Months	3,828,929	124,140	794,150	105,445	3,987	525
October	476,461	11,430	76,584	8,120	275	47
Total—Ten Months	4,305,390	135,570	870,734	113,565	4,262	572

* Data from Automobile Manufacturers Association.

Fewer Cars, More Trucks Scrapped Than Prewar

Scrappage figures compiled by R. L. Polk & Co. for the 12 months between July 1, 1948, and the same date this year show that while total registrations increased by 10 per cent or about 3.6 million vehicles, passenger car scrappage was less than half the normal prewar rate. During the year preceding last July 1, scrappage of passenger cars was only 871,000, compared with the normal prewar annual average of 1,617,853. The low scrappage rate indicates that the demand for new automobiles has not yet been filled, according to Polk. Another surprising result of the study is that truck scrappage during the 12 months period rose to 471,000, or nearly twice the prewar annual average of 249,000.

NEWS *of the* AUTOMOTIVE INDUSTRIES

British Hit Peaks in September Car Output and Exports

Peak figures for both production and export were reached during September by the British automobile industry. Output reached a weekly average of more than 8700 automobiles and 4500 trucks. Exports during September were 24,500 passenger cars, this being the best ever, and 8500 trucks, this being just below the all-time record set up last May.

Fred Rohr Group to Buy Rohr Aircraft

Rohr Aircraft Corp., Chula Vista, Calif., for several years a subsidiary of Newport Steel Corp., Newport, Ky., will be purchased from the parent concern by an organization headed by Fred H. Rohr. According to company officials, the assets and business of the firm will cost over $5 million.

Reo Building Pilot of New Army Truck

It is reported that the compression ratio of the Reo engine to be used in government trucks will be stepped up to 7 to 1, increasing performance up to about 145 hp. Several pilot models now are under construction at Reo.

Nash Fiscal Year Net Highest on Record

The Nash-Kelvinator Corp. has reported earnings of $26,229,930 for the fiscal year ended Sept. 30. The earnings are the highest on record for the corporation. The profits for the previous fiscal year were $20,132,954.

ECA Authorizes $7.1 Billion for Western Europe

Procurement authorizations issued by the Economic Cooperation Administration for western Europe amounted to a grand total of $7.1 billion through October. Major authorizations during the last half of October included $2.7 million for aircraft parts and accessories for France; $2.5 million in construction and mining machinery for Belgium-Luxembourg; and $1.2 million in agricultural equipment, excluding tractors, for Britain.

New Techniques Cut Production Costs

Efforts to reduce costs in automobile plants are proceeding at a high pitch, according to *Automobile Facts*, published by the Automobile Manufacturers Association. The publication quotes several examples to show how intensive studies have resulted in sizable savings. In one instance, repacking air valves and taking out unnecessary pipes in the compressed air system resulted in savings of $100,000 last year for one producer. In another instance a large company saved more than a million dollars by using a disposable shipping container to replace a permanent type to ship small parts to assembly plants. Another company during the last year has made 54 kinds of changes in machine equipment or attachments with saving on each improvement ranging from $2000 to $200,000 a year. Research in minor equipment has also paid dividends. One company found that by switching to cheaper plastic gloves it saved nearly $72,000 a year. In the same case a work apron costing 70 cents and lasting 32 hours has been replaced by a different type costing $2.13, but having a life service of 224 hours. Savings are estimated at more than $21,000 annually.

Studebaker to Expand In Canada

When restrictions are eased, Studebaker Corp. of Canada is going to expand its operations in Hamilton, Ont., Canada. This was learned by members of Parliament who were brought to Hamilton on a two-day tour of familiarization with Hamilton and the Niagara Peninsula. It was D. C. Gaskin, vice president and general manager of Studebaker in Canada, who told members of the hope for future expansion.

Almost Half of U. S. Farms Have a Truck or Trailer

Nearly half of the United States farms have a truck or trailer, according to a survey by the Bureau of Agricultural Economics. As of Jan. 1, 1949, it was estimated that the total was more than 1.9 million, a 28 per cent increase since 1945. The average farm truck age is a half-year more than the highway truck, and one out of five is 10 years or more in age.

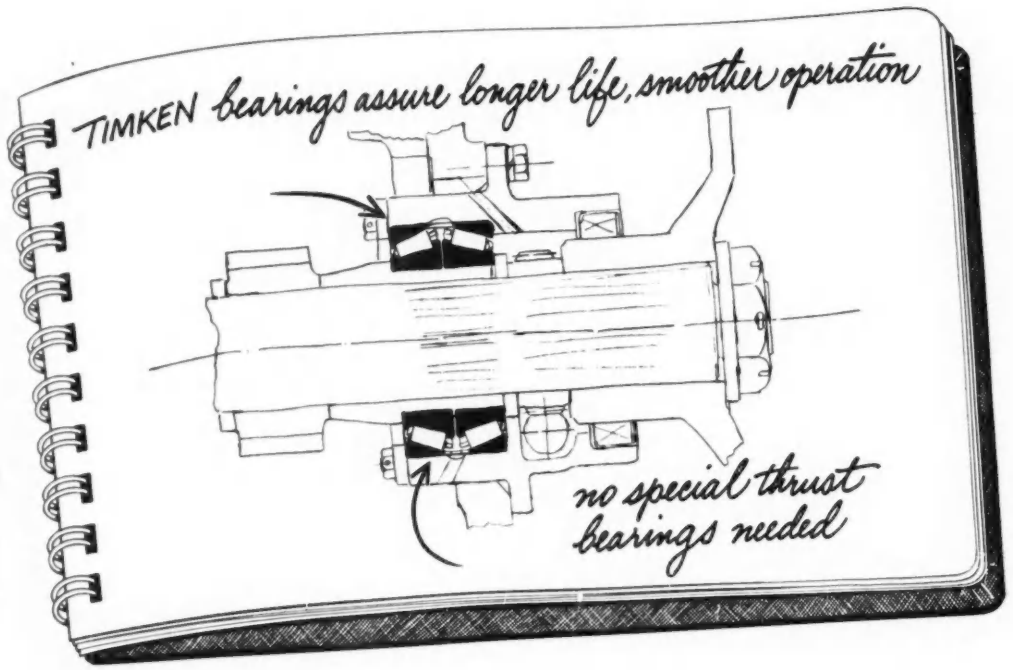
Canadair Producing 100 Sabre Jet Fighters

Production of 100 F86A Sabre jet fighter airplanes for the Royal Canadian Air Force is now underway at Canadair's (Ltd.) two plants just outside Montreal. For the first time in Canada, jet airplanes are being mass produced on an assembly line basis. This has necessitated the introduction to Canada's aircraft manufacturing industry of several new production techniques. Upon delivery of this order, Canada's Air Force will be equipped with one of the most modern high performance aircraft in the world, and one which holds the officially recognized record of 670 mph.

CALIFORNIA CUSTOM

Using a Lincoln chassis and V-12 engine with automatic overdrive, Bryson E. Hickman, La Canada, Calif., assembled this custom car which has a detachable convertible top, and electrically-controlled doors. Its windows, trunk, and hood are operated from a dashboard control which employs a hydraulic-electric system.

Wide World

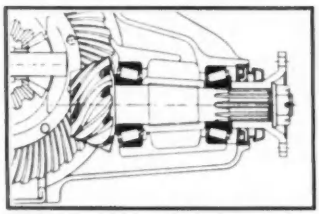


How to give your secret transmission more talking points

TIMKEN® bearings on the shafts of your newest transmission are your best insurance of long life and smooth operation, no matter how you plan to convert power. So if you want your transmission to have the maximum number of talking points when you take it out from under wraps, include Timken bearings in your secret designs *now*.

Because Timken bearings carry both radial and thrust loads, shaft deflection and end-movement are eliminated. Moving parts are held in proper alignment. Clearances between revolving parts can be closer without danger of interference. And if there are gears in the picture, Timken bearings help them mesh more smoothly and last longer.

With Timken bearings your transmission is more trouble-free because it is more simple in design. No special thrust bearings or washers are required. Timken bearings can be easily adjusted when shafts are installed in the transmission housing, making possible a more simplified mounting.



All but two cars use Timken bearings on the pinion. Here's a typical application.

For a quick idea of what Timken bearings can do for transmissions, look at pinions. Pinion bearings have the toughest job of any bearing in the car. And today all but two makes of passenger cars use Timken roller bearings on the pinion!

For help in designing Timken bearings into your newest transmission plans, call upon our engineering staff for the latest technical data. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company . . . because our vast manufacturing facilities are widely dispersed . . . you will find The Timken Roller Bearing Company a supply source of outstanding reliability.*

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

TIMKEN 1899 50 1949 YEARS

50th birthday of the company whose products you know by the trade-mark: TIMKEN

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

Modern Cars and the Problems of Off-Street Parking Facilities

By Fred W. Mac,
President, Ramp Buildings Corp.

ONE of America's top flight automobile designers, speaking for publication recently in a leading business magazine, said that he had told his assistants to work on sketches for a 1950 model car with these words—"Take off the excess fat. Make the car look 'lean and hungry.'" To the writer those few words are as welcome as another signed contract to plan a new million dollar off-street parking facility.

Now I do not presume the slightest knowledge of what a car should look like—how big, long, wide, low, sleek and daring it should or must look to satisfy the car buying public. But as the president of Ramp Buildings Corp., for 30 years a nation-wide consulting firm on all phases of developing multi-floor off-street parking facilities, with over 400 big and small structures to our credit, I do have a few things to say about the design of cars from the standpoint of the economics of garage planning, construction and operation.

The arithmetic of our national parking crisis is well known. 1949 will see the U. S. automobile industry break its production record of 20 years standing. By the end of 1949, 11 million more cars than in 1945 will be choking the highways and streets of the nation—a grand total estimated at over 35 million units. When we remember that last year people drove 395 billion miles in the U. S.; that three out of every four cars and trucks on rural roads either start from, or stop in, a city; and that local streets in cities and towns, constituting about 6 per cent of total road and street mileage, serve about 30 per cent of total traffic in vehicle miles, it is easy to appreciate that our cities and towns are close to the automobile saturation point from Mr. John Q. Public's standpoint. For shopping, for business, for going to and from work, for trips to the city—the automobile is ceasing to be the great convenience and pleasure it once was for car owners. It is oftener the most difficult way to "go to town."

This described situation is bad for everybody. Retail businesses in valuable downtown areas see their business threatened. The process of decentralization by business to outlying areas begins. The blight starts to set in, downtown real estate values fall off, and the municipalities feel the impact in property tax losses. And through it all, a large potential market for new cars, according to figures on family income related to number of people per car in metropolitan areas, remains untapped—and people generally do not get real satisfaction from owning the automobile manufacturer's product.

The answer to all these problems is, of course, adequate off-street parking facilities, sponsored by private businesses individually and in groups, by municipal projects, and by cooperative business—municipal programs.

Some of each of those types of action programs to get off-street facilities built are going forward today. And the primary thinking behind each project, whether it's by an individual department store, bank, hotel—or a group of merchants—or a city—is the planning and design of a structure that will solve the local traffic congestion problem in their area in the most economically feasible manner. This means preferably in a profitable manner—the structure either planned so it can earn a profit in its own right, or to pay for itself and then some in terms of preserving property values and maintaining, or increasing, business volume. It is when we at Ramp are dealing with this complex, and perhaps most important fundamental of garage planning and design, that our analysis runs head-on into the long-term trend in automobile design.

In the past 30 years, based simply on the statistics, the average American automobile has grown 3½ ft longer, one ft wider and one ft lower. To the eye, the effect of these design changes, of course, has been to give the cars a more sleek and racy look. In a complete reversal of the styles 30, or even 20 years ago, today every full sized stock model American car is wider than it is high from the road to the roof. But such statistics don't begin to tell the true story; they only

(*Turn to page 67, please*)

Automatic Transmissions

PART V

1950 STUDEBAKER TRANSMISSION

Design, Construction, and Operation of the New Unit Developed Jointly by Studebaker and Borg-Warner. Part IV of This Series on Modern Automatic Transmissions Was Published in the Sept. 15 Issue of AUTOMOTIVE INDUSTRIES.

By Joseph Geschelin

FINAL details of Studebaker's fully automatic transmission designed by Borg-Warner and developed jointly by these two companies reveal impressive operating features and unique characteristics of design. This transmission, produced by the Detroit Gear Div., Borg-Warner Corp., will be offered as optional equipment at extra cost early in 1950 on Studebaker passenger cars.

The basic transmission comprises the following major elements:

1—A three-element torque converter, featuring fabricated construction instead of castings.

2—Two epicyclic (single planet) gear sets with helical gears, providing three forward speeds and one reverse.

3—Two gear type oil pumps—one front, one rear.

4—A multiple disk clutch, having four friction plates.

5—Single-plate disk clutch, hydraulically operated, and running in oil for direct drive, cutting out the torque converter and planetary system when in direct drive. Friction facings are of cork.

6—Three band type clutches (or brake bands) with servo mechanisms.

7—Three free-wheel units—one for the stator, the other two within the transmission.

8—One valve block assembly.

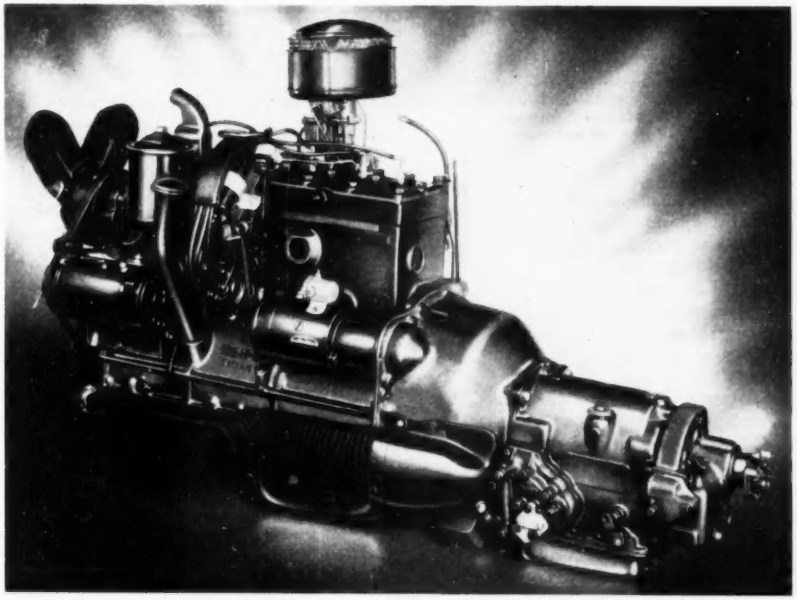
9—A centrifugal type governor the function of which is to control the action of the direct drive clutch.

In essence, this is a three-speed forward transmission with the normal forward position comprising two automatic speed ranges, and with a direct clutch cutting out the torque converter and planetary system when in direct drive. The engine can be started only with shift lever in "N" or "P" position. The "L" range is intended only for quick acceleration and engine braking on steep down grades.

From the standpoint of the driver, this unit is used without a clutch pedal and has many features of positive driver control through the shift lever. The following options are provided by selector control which gives positive manual positioning of the main control valve:

"P"—Park Position (the lever must be lifted from "N"). When the control lever is placed in this position, it disengages the engine as in neutral and engages a parking lever pawl with a mating gear which locks the transmission output shaft to the transmission case. Moreover, a hydraulic interlock prevents the engagement of the pawl with the gear at speeds above 3 to 5 mph; whether or not the control lever is in "P" position. This prevents use of the park position at any unreasonable speeds which would be detrimental to personal safety and to the mechanism.

"N"—Neutral. In this position, the engine is disconnected from the drive line. It is impossible to start the engine unless the shift lever is first placed



Installation of Studebaker automatic transmission showing design of removable unit assemblies such as the servo unit at the left on the case, and the rear housing containing the governor. Two of the four fastenings for dis-assembly of the gear box from the bell housing may be seen at the top of the case. The air duct for air cooling is in the center, mounted on the bell housing.

in this neutral position or in the park position.

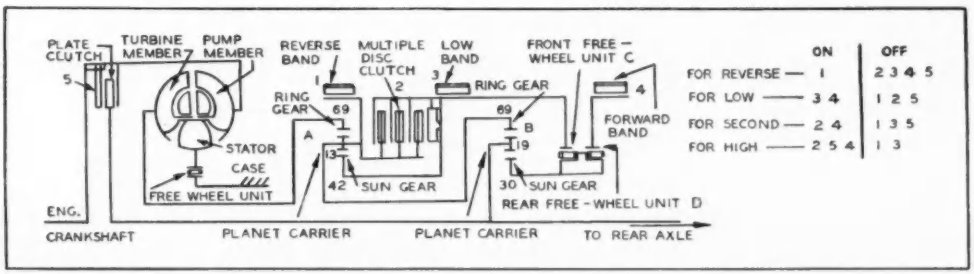
"D"—Drive. This is used for normal forward and comprises two automatic speed ranges.

"L"—Low or 1st gear. This position is used for engine braking on down hill grades and high starting accelerations. The lever must be lifted from "N" or "D" to get into this position.

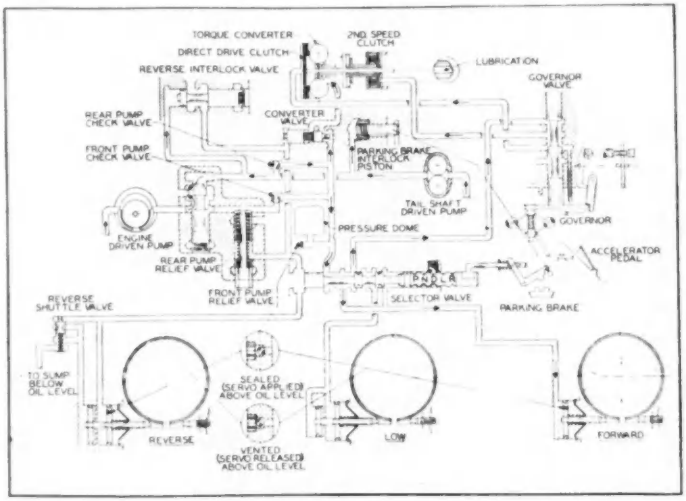
"R"—Reverse. This position is used for reversing. The lever must be lifted from "N" or "D" to get this position but it is on the same plane as "L." Another hydraulic interlock is provided for reverse, as in the case of "P," to prevent damage in the event of inadvertent shift into reverse when the car is moving forward in gear.

Because the Studebaker transmission offers numerous features of unique character these are described at this point to lend emphasis. First of these is the direct clutch designed to cut out the torque converter when in direct drive in the interest of maximum fuel economy. As will be described later, it is actuated by a combination of centrifugal governor action as well as throttle control.

The second feature is an automatic lock-up of the transmission when a stop is made in direct drive on an up-grade. This takes the place of the hill-holder and requires no attention on the part of the driver. The lock-up is released instantaneously when the accelerator pedal is depressed.



Schematic diagram showing power flow in reverse, low, second, and high.

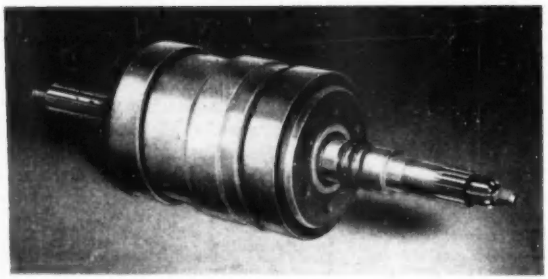


This valve diagram illustrates the action of the hydraulic system. Transmission is in direct drive and pressure is from the rear pump.

This is supplemented by a positive "no-creep" feature when stopping in traffic on ordinary pavement or road. "No-creep," as will be described later, is accomplished by an automatic arrangement for setting the rear wheel brakes as the brake pedal is depressed for a traffic stop.

Positive down-grade engine braking—on steep grades as well—is accomplished by a down-shift to "L" with closed throttle. This provides an extremely low gear reduction which is said to hold car speed at a uniformly low rate. The down-shift maneuver takes place without shock as the low band is applied smoothly in the unwrapping direction through suitable provision of a compound piston servo and pressure dome.

Rocking of the car to get out of ruts or ice and snow is readily achieved by moving the control lever rapidly back and forth from "L" to "R." This maneuver has been simplified by placing both "L" and "R" on the same plane so no lifting of the lever is required.



For servicing, the gearset assembly can be removed as a unit.

To prevent damage of the mechanism in the event of an inadvertent shift into "R" or "P," Studebaker has introduced hydraulic interlocks which instantly convert the mechanism to the neutral condition.

As will be mentioned later, air cooling is employed for cooling the torque converter, thus simplifying the entire installation, eliminating plumbing, and leaving the engine cooling system intact.

Finally, this unit features a kick-down when in direct drive, from third to second at the will of the driver.

In addition to unique design and operating characteristics, Studebaker has impressed on this mechanism some unusual features of accessibility for adjustments and unit replacements in service. These will be described later.

Let us now consider the major design elements and their basic operational phases. For this purpose the reader is referred to the cross-sectional assembly drawing as well as the diagrammatic sketch to which reference is made in the description given immediately below.

The torque converter is of single three-element type having the pump member connected to the crankshaft, the turbine member—at the left—connected to the output shaft, and the stator member—for torque multiplication and reversal of fluid flow—at the center. The latter is mounted on a sprag type free-wheel unit connected to the case to permit only one direction of rotation. Maximum torque multiplication, at stall, is of the order of 2.15 to one and this occurs at an engine speed of 1500 rpm.

The torque converter is made up of fabricated elements and does not employ castings for the wheels. In essence, it is an assembly of stamped pieces with

individual stampings for the vanes of the three elements.

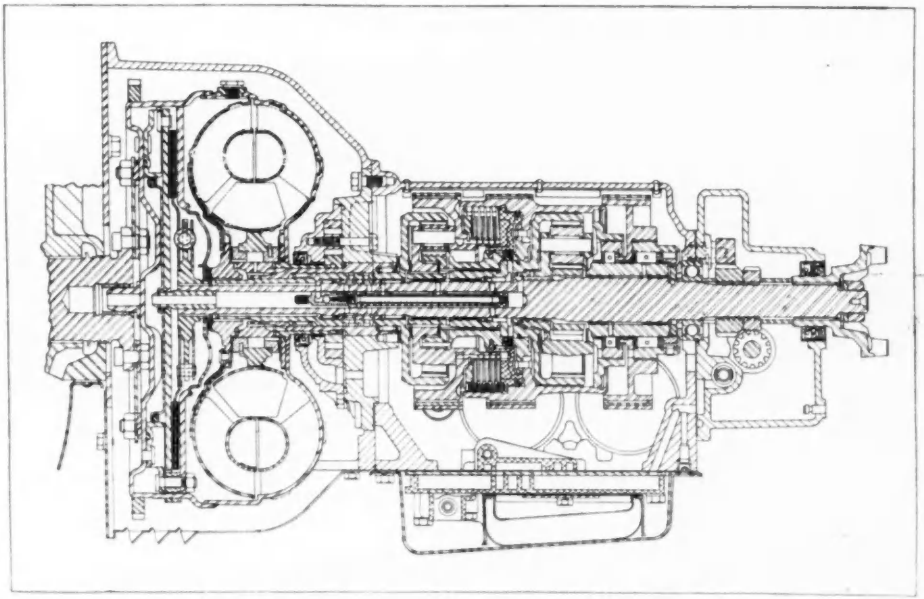
Not shown on the drawing is the provision for air cooling the torque converter. This is effected by attaching a formed sheet metal shell or baffle to the pump element, the baffle being fitted with eight vanes to serve as a centrifugal fan. Air is directed into the unit through an intake opening in the ball housing and forced to enter the annular space between the baffle and pump, thus giving the air stream positive direction and forcing it to scrub the surface of the torque converter.

Refer now to the diagrammatic sketch to follow the mechanics of the principal maneuvers. In first gear, low band (3) and forward band (4) are applied through their servo mechanism. The low band holds the sun gear of planetary "A" stationary while the forward band holds the sun gear of planetary "B" stationary through the rear free-wheel unit "D." Power flow in this phase is from the turbine shaft of the converter to the ring gear of "A." The total reduction through the two planetary gear sets is 2.308 to one. This combined with torque multiplication produces a maximum ratio of approximately 4.96 to one

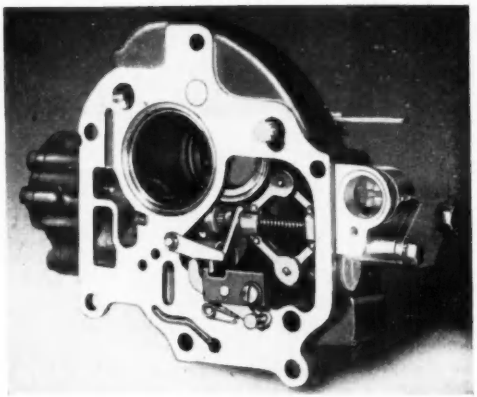
In second gear, low band (3) is released while the multiple disk clutch (2) is applied by a hydraulic piston. In this instance, the clutch locks together the planet carrier and sun gear of set "A" and connects converter output directly to the ring gear of set "B," while the sun gear of set "A" free-wheels on unit "C." The ratio in second gear, therefore, comes from set "B" which is 1.435 to one. This combined with torque multiplication gives a total reduction at the output shaft of 3.085 to one.

In direct drive, multiple clutch (2) and the forward band (4) remain on; while the plate clutch (5) is applied through a hydraulic piston mounted in the flywheel end. Consequently, the torque converter as well as the planetary gear set are by-passed and power flow is directly from the crankshaft to the axle. Both sun gears free-wheel in this phase.

For reverse all bands and clutches are released except reverse band (1) which is applied through its servo to hold planet carrier "A" stationary. Under these conditions the sun gear rotates in reverse direction. This reverse rotation is transmitted to the sun gear of "B" through its free-wheel unit which does not free-wheel in reverse rotation. At the same time



Longitudinal section of Studebaker's fully automatic transmission showing details of the torque converter, single plate clutch for direct drive, two planetary gear sets, etc.



The governor housing assembly illustrated here can be taken off without removing the entire transmission.

the ring gear of "B" is stationary because of its connection to planet carrier "A." This results in a reverse reduction of 2.009 to one and in combination with torque multiplication provides a reduction of 4.239 to one at the axle.

In neutral there is no connection between the converter and transmission since all bands and clutches are released.

With the use of this transmission rear axle ratio is reduced to 3.54 to one as compared with conventional axle ratio of 4.55 to one. With standard overdrive equipment the ratio at the rear axle is 3.19 to one when overdrive is engaged.

Consider now the major elements of the control system. The front pump, of internal gear type, is driven by the engine; the rear pump, of spur gear type, is driven by the tail shaft. They supply the hydraulic pressure for the entire system as well as lubrication. The front pump is employed at starting and until a normal road speed has been established. The rear pump then takes over while the front pump is automatically cut out and bypassed. The rear pump also serves to supply hydraulic pressure when pushing the car to start the engine. For a push start the rear pump takes hold quickly and develops sufficient pressure to start the engine when the car is at a road speed between 10 and 20 mph.

Studebaker Transmission

The control system operates on a normal pressure of 80 psi, although pressure at the converter is held at 27 psi. Pressure for reverse is 160 psi, the boost being obtained by increasing the resistance of the front pump relief valve. Capacity of the reverse band is further increased by the double piston on the reverse band.

One of the major features of the control system is the complete elimination of "timed" or "modulated" controls. The valves are divided into two major classes: regulation, and control. There are three regulator valves as follows:

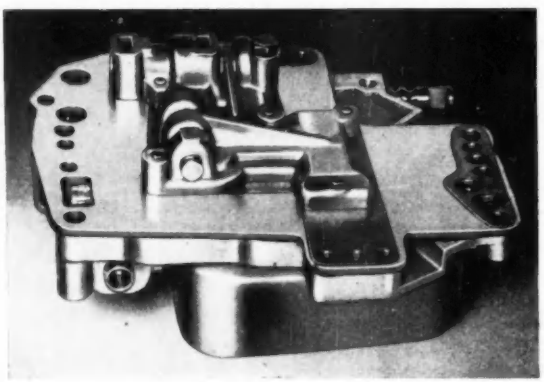
(a) One to provide 80 psi from the front pump and also to supply 160 psi in reverse.

(b) One to provide 80 psi from the rear pump; also to reduce front pump pressure to a minimum when the rear pump can adequately supply the system.

(c) One to provide 27 psi to supply torque converter.

In the control group are just two valves, one being the selector valve for manual positioning by means of the shift lever. The other control valve is operated by the centrifugal governor, its action being dependent upon a combination of governor and throttle pressure. This valve has two positions—second, and direct. Upshifts and down-shifts thus are controlled by a combination of torque and speed demand, the torque demand being approximated by accelerator pedal position. Speed demand, on the other hand, is interpreted by the speed of the governor on the tail-shaft. A downshift from direct drive to second occurs when the throttle is depressed past the detent at speeds below 50 mph but above 18 mph. On

(*Turn to page* 85, *please*)



After draining oil from the transmission and removing the oil pan, the valve block assembly can be removed without disturbing other units.

Synchromesh Transmission Adopted as Standard Equipment On All Cars With Improved Hydra-Matic Optional. New Bodies, Changes in Styling, and Mechanical Improvements Highlight 1950 Models

1950 Oldsmobiles

An interesting variety of new bodies, two major improvements in the optional Hydra-Matic transmission, the availability of a synchromesh transmission as standard equipment on all three series of cars, coupled with other detail mechanical improvements as well as changes in exterior styling and interior treatment are among the major features of 1950 Oldsmobile line.

Except for changes in exterior treatment and interior styling, the basic bodies on the Olds 76 and 88 remain unchanged and the chassis remains with a wheelbase of 119½ in. The special Holiday model and the two-door notch-back sedan, are new Oldsmobile body styles in 1950. Body models offered on the 76 and 88 include the following: four-door notch-back sedan; two-door notch-back sedan; two-door plain-back sedan; the convertible; the Holiday; station wagon; and sport coupe.

All bodies for 98 cars are new, featuring Fisher models introduced for the new season. These include the following types; four-door notch-back sedan; two-door plain-back sedan; the Holiday; and the convertible. Wheelbase will be 122-in.

From the standpoint of mechanical changes, it is of interest that neither the six-cylinder nor the Rocket engine—both new models—have been changed in any way. A larger synchromesh transmission—of greater capacity than the one offered on the Series 76 Oldsmobile—will be standard equipment on both the Series 88 and the 98 Oldsmobile for 1950. Consequently, Oldsmobile's new Whirlaway Hydra-Matic transmission becomes optional equipment on all models.

Two major improvements have been made in the Hydra-Matic. The first, a modification in the hydraulic control system designed to produce smoother shifts, does not affect mechanical linkage in any way. The second alteration is a change in starting gear ratio in the drive range to improve smoothness of starting and get-away. For the 88 and 98 models, the starting ratio will be 2.63 to 1 (former ratio—3.82 to 1); while on the 76 this becomes 3.03 to 1. The 3.82:1 ratio is retained in the low range for exceptionally steep grades and for getting out of sand or mud holes. To prevent loading of the carburetor incident to the change in starting ratio, the carburetor accelerator pump has been altered to provide a leaner mixture at starting.

Another item of interest is the adoption of the well known Saginaw recirculating ball type steering gear on the Model 98. This change, together with an increase in overall steering ratio to 27 to 1, will make for greatly improved steering on the 98. Steering conditions on the 88 also have been improved by upping overall steering ratio to 25 to 1.

The 98 also has been treated to a number of other detail mechanical changes. Spring rate has been lowered both front and rear, this, together with suitable changes in the calibration of shock absorber valving, being designed to improve the ride. With the introduction of new bodies on the 98, the frame has been made stiffer and rubber insulators added between the body and frame. These changes add up to a reduction in noise and increased comfort for the passengers.

Brake effort has been reduced on the 98 by a change in the brake pedal to increase mechanical advantage.

The tire set-up remains the same, save for the introduction of a new tire size—8.00-15 as optional equipment. Tire equipment is as follows: 7.10-15 standard, 7.60-15 oversize at extra cost on the 76; 7.60-15 standard on the 88; 7.60-15 standard, 8.00-15 oversize at extra cost on the 98. The last has a standard inflation pressure—cold—of 24 lb.

The new body models for the 98 have considerably more glass area all around, particularly with respect to the rear window which has a wrap-around effect on the sides. The windshield is a one-piece curved glass

(*Turn to page* 68, *please*)

The Complexity Car

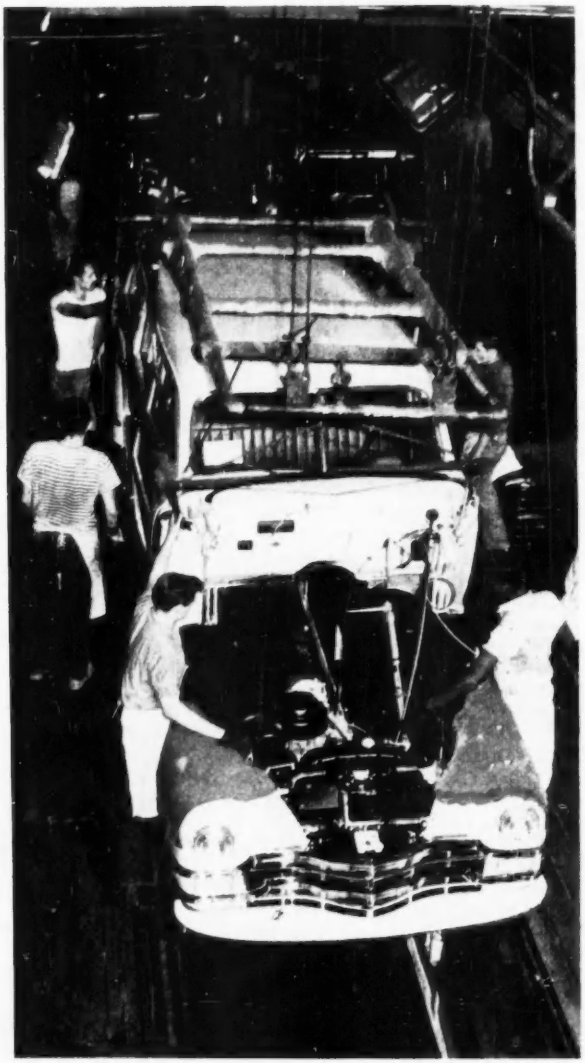
Major Options Offered by Chrysler Make Possible over 250,000 Automobiles with Different Body Styles, Colors, or Equipment

SCHEDULING problems can become very complex in relation to the number of options offered by the maker to the consumer of the modern automobile. The fact is that the possible combinations of options for any make of car are greater than one would guess, thus highlighting the efficiency of the specialists engaged in planning and scheduling motor car production. It is both baffling and intriguing to visualize the mechanism that makes possible the mating of color of bodies, fenders, front end assemblies, etc., as they meet on the final assembly line. They come in on conveyors from diverse directions and ofttimes from different buildings, yet they come together at the right time on the right chassis.

Through the courtesy of the Chrysler Corp., the following procedure of how they schedule motor car production is presented.

Consider the tabulation listing current models and body types for each model, together with standard color options, convertible top colors, trim options, and equipment options. Just the major option items listed here combine to produce over 250,000 different motor cars. Any single special item such as a rear view mirror, an oil filter, or a change in rear axle ratio will double the number of combinations for a given model group. As a matter of fact only five or six will boost the combinations over the million mark.

Actually this is the simplest phase of the scheduling operation. The difficult



Installing a body after it comes from the body drop according to the master schedule.

# of Scheduling Production Today

By Joseph Geschelin

problem is the advance planning required to assure the flow of raw materials and component parts from foundries, forge shops, machine shops, press and body shops, and the vendors. It represents a pipe line, continuously flowing at the proper rate to meet deliveries scheduled each day. This pipe line is responsible for the engines, axles, transmissions, suspensions, bodies and sheet metal, and the thousands of other parts that must meet the final assembly line absolutely without fail, day in and day out.

About 15 years ago AUTOMOTIVE INDUSTRIES published a number of articles dealing with methods of scheduling in the industry. The basic principles probably are unchanged, but scheduling today aims for precision control, closer attention to the size of banks, and greater supervision of inventories and the flow of the pipe line. Flexibility of inventory control is imperative to meet the potentially shifting demand and to check the debilitating effects of sporadic strikes and close-downs.

There is a vast difference, too, between the problem of scheduling to meet the start of a new program and that of maintaining flow at various rates during the course of the model run. For the former case, lead time is the basic criterion. How far in advance must each item be scheduled so as to reach the line at the start of production? Once production flow has been established, the pipe line can be kept flowing. On the other hand, changes in product design, even for the penny item, poses the problem of lead time even during the model run.

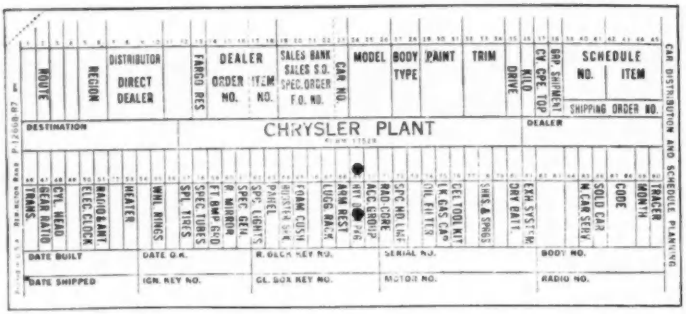
Lead time touches on the problems of the vendor, the foundry and forge shop, the flow of raw materials from their sources, the scheduling of machine shops and press shops. Lead time also includes transportation, since most producers buy from sources scattered over the 48 states. With motor car assembly plants distributed so widely, lead time is a major factor in planning their production. For example, the Chrysler Cali. plant is 10 days away from bodies in Detroit.

Assembly operations and certain other functions are considerably faster. For example, stampings for the body plant require scheduling only one to three days ahead of assembly, depending upon the part. And bodies can be assembled, painted, trimmed, and delivered within a day.

Life blood of the final assembly line, however, is in the maintenance of banks of material at the point of usage. It requires delicate balance, since floor space is at a premium while stored inventory represents idle dollars. Banks are vitally important for the role they play in smoothing the production cycle. They permit

TABLE OF OPTIONS FOR CHRYSLER CARS

MODELS	Body Types	Body Variations	Body Color Options	Convertible Top Colors	Trim Options	Equipment Options
ROYAL	Four-door Sedan	3	13		6	36
	Club Coupe	3	13		6	37
	Eight-passenger Sedan	3	13		6	39
	Station Wagon	3	3		1	38
	Chassis with Cowl	3	0		0	28
	Chassis less Cowl	3	0		0	28
WINDSOR	Four-door Sedan	3	13		10	33
	Club Coupe	3	13		10	34
	Convertible	3	15	3	10	33
	Eight-passenger Sedan	3	13		8	35
	Limousine	3	13		8	35
SARATOGA	Four-door Sedan	3	13		6	33
	Club Coupe	3	13		6	34
	Chassis with Cowl	3	0			28
	Chassis less Cowl	3	0			28
NEW YORKER	Four-door Sedan	3	13		10	33
	Club Coupe	3	13		10	34
	Convertible	3	15	3	10	33
TOWN & COUNTRY	Convertible	3	10	4	10	33
IMPERIAL SEDAN	Four-door Sedan	3	3		3	27
CROWN IMPERIAL	Eight-passenger Sedan	3	13		4	27
	Limousine	3	13		4	27



Sample of card used by the Tabulation department for punching specifications

operation of the final assembly line even if there is a breakdown in some department, a work stoppage, or a lost shipment.

Generally speaking, Chrysler maintains a bank of major sub-assemblies such as engines, transmissions, axles, front end suspensions, etc., equivalent to one or two days' production. The bank of stampings for the body shop runs from one to three days' supply at the most. Complete bodies, the most bulky single item in the car, are held to a bank of six hours at the maximum. On the other hand, the major component items—parts that go into engines, transmissions, axles, etc.—which entail considerable fabrication, are prepared with a maximum bank of about 15 days' supply.

Let us consider just one phase of the matter—the scheduling of the final assembly line alone. There are three major departments—Distribution (sales), Planning and Scheduling, and Tabulating — whose primary efforts are devoted to scheduling. It is to be understood that this is an oversimplification, since the entire organization contributes its energies to get cars rolling off the assembly line and onto drive-aways and freight cars.

The actual scheduling of cars to be built for delivery each day is the function of Distribution. To this end, distribution issues specifications for each car, according to the customer's order, to the Tabulating department. The latter immediately translates these specifications into the standard punch card, illustrated here. Copies of the punch card give the final assembly line two days' advance notice. Similar instructions are issued to the Kercheval body plant — serving Jefferson — one day in advance. Therefore, bodies being built today are for use on the assembly line the following day.

But even this small segment of control—body delivery and scheduling of the final assembly line—is subject to other controls and adjustments.

This is the province of the Planning department. Planning is the source of all information on the course of production and the availability of parts and bodies. Consequently, Planning advises Distribution just how many cars can be built on a given day, and in what body styles. From this basic information, Distribution must pattern its instructions to Tabulation.

Whereas Tabulation controls the final assembly line and the flow of bodies to it, Planning is responsible for scheduling the flow of all materials and sub-assemblies that feed the final line.

The Planning department sub-divides its responsibilities under four divisions—Engineering Specifications, Follow-Up, Scheduling, and Materials — which are also sub-divided for varied detail.

The Engineering Specifications group sets up material record cards on each individual item that goes into the car as soon as they receive the release from Highland Park engineering. The Follow-Up department is charged with actually following the course of every part from the very source until it reaches the point of usage. It is concerned about shortages, lost shipments, and replacement of rejects; it is the trouble-shooter in general.

The Scheduling group is the one that actually supplies the schedule for all operations in all departments, taking into account the daily requirements, production lead time, materials lead time, transportation lead time, etc.

Scheduling supplies the information on which the basic supply stations for the final assembly line act. By this means they control the intricate web of production flow of parts and assemblies that make up the car. This control is exercised through a network of tele-typewriter stations connected to the central tele-typewriter control room. Tele-typewriter instructions are issued daily, one day ahead, and are transmitted simultaneously to each of the stations listed in the table shown above in the center of this page.

(Turn to page 68, please)

Tele-Typewriter Stations

Jefferson Plant

1st floor	Paint Shop
1st floor	Frame Line Bay 73
1st floor	Chassis Line Bay 56
1st floor	Car Assembly Line
2nd floor	Wheel and Tire Bay 62
2nd floor	Front End Bay 50
2nd floor	Body Hardware
1st floor	Engine Storage
2nd floor	Body Receiving Room
4th floor	Planning
1st floor	Paint Shop

Kercheval Body Plant

Cushions	3rd floor
Instrument Panel	1st floor
Trim	4th floor

Are Quality Specifications for 5W Engine Oil Necessary?

Pros and Cons of the Issue Discussed at Recent API Meeting in Chicago

THERE is general agreement now that starting in sub-zero climates can be definitely improved by the use of 5W engine oil. In fact, several automobile manufacturers cognizant of this property of 5W oil have recommended its use in their vehicles for extremely cold weather operation in place of the combination of 10W plus kerosene. Many oil refiners are marketing the oil wherever the climate warrants its use.

At the recent meeting of the American Petroleum Institute in Chicago, there was some discussion, however, on whether quality requirements should be written into the grade classification of 5W oil by either the automobile manufacturers or the SAE instead of viscosity requirements only.

Presented here is an extract of a paper, "Field Experience With 5W Motor Oil," in which the author, A. B. Anglin, offered the suggestion that became the basis of the discussion. Also given are extracts from the prepared discussion of Mr. Anglin's paper.

Field Experience With 5W Motor Oil

By A. B. Anglin,
The British American Oil Co., Ltd.

AT present 5W grade is defined only by the viscosity of 1800 sec to 3200 sec at 0 F; and it is possible to produce within this specification oils of widely varying characteristics, some of which might not be suitable lubricants even for light passenger-car service. Until more data are available on the performance of low vi and straight mineral types of 5W oils, it is the author's suggestion that the 5W designation be restricted to premium or heavy-duty oils of medium to high viscosity index.

Although this may be objected to, on the grounds that it is introducing a quality requirement into a classification system which is intended to indicate viscosity only, the fact should be recognized that, in order to secure an oil with the desired low-temperature characteristics, certain properties—such as the viscosity at engine operating temperature and load-carrying ability—are approaching, or going below, the minimum requirement for safe operation. This situation does not exist with the heavier grades. It has been demonstrated that 5W premium oils of high vi are satisfactory. This has not yet been proved for low vi or straight mineral oils, so far as is known. If 5W oil is to be adopted, either by the automobile manufacturers or by the SAE, as an industry standard, it would appear that this should be with a quality requirement included, at least until such time as it is shown to be unnecessary.

Should U. S. Establish Canadian Policies?

Discussion by H. C. Mougey,
General Motors Corp.

WHEN and if the SAE takes official action in regard to 5W, it would be possible, according to SAE rules, to cancel this restriction and to specify a number of "quality" requirements, but I do not think that either the oil or the automobile industry feels that this should be done at this time.

The oil companies manufacture and market lubricating oil, and it is their responsibility to see that the lubricating oil which they market is satisfactory in quality. However, the automotive industries recommend the types of lubricants for the vehicles and equipment which they make and market and, consequently, they also have a certain very definite responsibility in this matter. The words used in their recommendations should have a very clear meaning, and the car owner should have some assurance that, in following the recommendation, he is getting the kind of material which the automobile manufacturer intended to recommend. (*Turn to page* 87, *please*)

Auxiliary Gas Turbines Power in

By H. J. Wood and F. Dallenbach
AiResearch Mfg. Co.

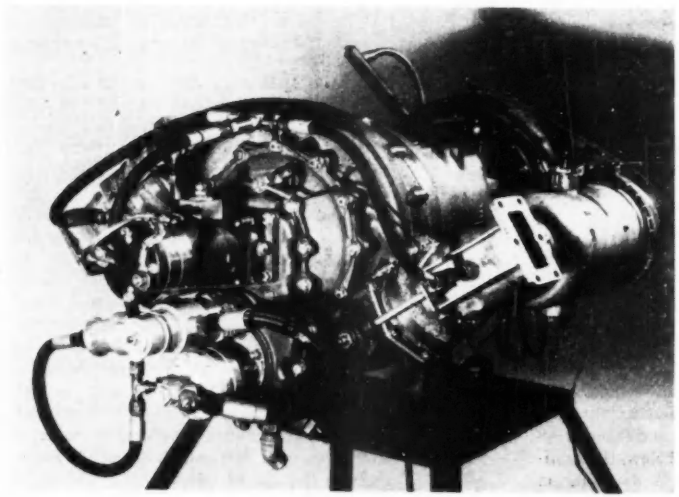
THROUGH the past ten years the problem of provision of auxiliary power for large aircraft has become increasingly acute. In actual fact, at the extreme operating altitudes, problems have been considered when the power utilized by the aircraft for services other than propulsion has amounted to between five and ten per cent of the available propulsion power. Lest this figure appear too startling, it is well to remind the reader that the same auxiliary power at sea level would only represent between one and two per cent of the available propulsion power. In this field, we are dealing with extremely important design and development problems on which the success or failure of certain types of aircraft can depend.

Since there is no quantitative information to substantiate any definite conclusion, a solution to this problem is not offered at this time. Instead, it is proposed to show an auxiliary power system to do a certain type of job.

Fig. 1 represents a highly hypothetical airplane. It has four engines of about 10,000 lb thrust rating and a gross weight of 175,000 lb. It has a continuous electrical load demand of 200 kw and an overload electrical demand of 300 kw for a maximum of five min. It also has the customary refrigeration, pressurization, and miscellaneous intermittent actuation services. The major portion of the electrical load is required in the form of 400 cycle alternating current, although some 120 v d-c is needed. The system as indicated provides two gas turbine compressors feeding a common air pressure manifold which also may be supplied with compressed air bled from the compressors of the four main propulsion engines. Power is converted from the compressed air manifold by a pair of power turbines, each of which drives a gearbox on which is mounted a 90-kw alternator and a ten kw d-c generator. Each of the power turbines has a variable-area nozzle and a combustor. Thus, the compressed air, coming from a gas turbine compressor or a main engine, is subjected to fuel injection and combustion in order to raise its temperature level before expansion through a power turbine. The two main alternators are run in parallel and synchronized. Provisions are made for isolating portions of the compressed air manifold through shutoff valves in the event of damage to a particular section. This basic arrangement, illustrated in Fig. 2, has been given the name "bleed and burn," and it is conceived with the idea in mind on conserving the compressed air supply as much as practicable.

We can also state that the pneumatic system has

(*Turn to page 78, please*)



Gas turbine compressor bleed-off version of the type proposed for use in aircraft for pneumatic power. The unit weighs 150 lb. with controls and enclosure and develops 65 air hp.

for Pneumatic Aircraft Applications

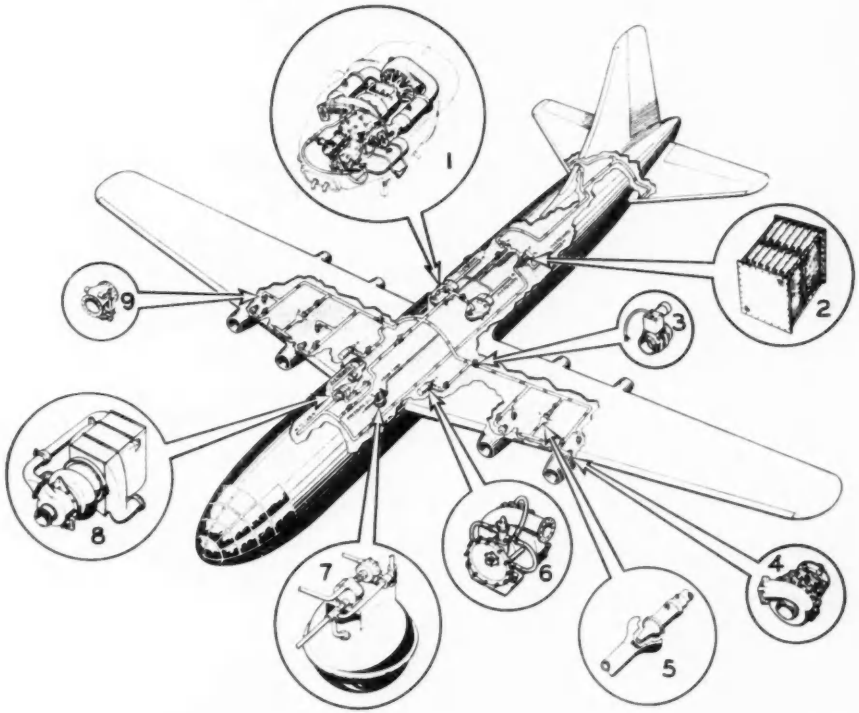


Fig. 1—Proposed pneumatic power system: (1) gas turbine compressor unit; (2) cabin air heater; (3) motorized shut-off valve; (4) pneumatic starter; (5) de-icer; (6) pneumatic alternator drive; (7) hydraulic accumulator; (8) cabin air refrigeration unit; (9) check and shut-off valve.

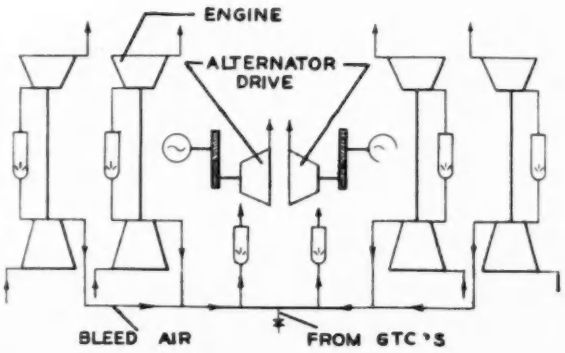
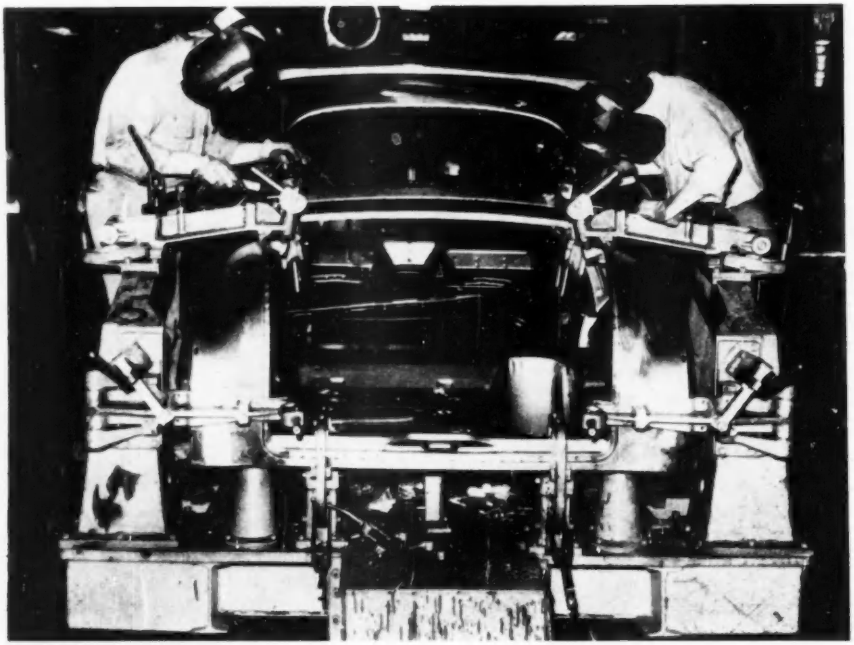


Fig. 2—Schematic diagram of simplified bleed and burn system for a two turbine arrangement and four engines.



Two operators weld the upper deck extension to a quarter panel while parts are held in this large fixture.

Latest of

By R. H. Bennewitz
and F. J. Pilia
The Linde Air Products Co.

APPROXIMATELY two years ago the inert gas-shielded arc welding process—Heliarc Welding—was introduced to the automobile industry for welding two-piece fenders. This first successful application of the process has resulted in its use on body joints, bumper guards, bumpers, and other accessory parts requiring metal finishing. The process permits higher quality parts, simplified dies, reduced finishing costs, improved surfaces for paint, and elimination of soldered joints. Expanded use of the process promises to greatly revise automotive sheet metal joining procedures.

Where metal finishing is not a problem, selection of the proper welding process is not difficult and we do not propose or suggest that Heliarc welding can necessarily contribute anything to accepted procedures. When the body engineer receives the layout drawings from the styling department, he is faced with the problem of deciding whether various parts can best be made by drawing the parts in one piece or by using simplified dies and joining the parts by welding. In the past, it has been the practice to resort to welding only where it has been impossible

High production and low cost are achieved by making this rear fender in two sections. Since the stampings are joined by welding, many items of difficult contour may be readily manufactured.

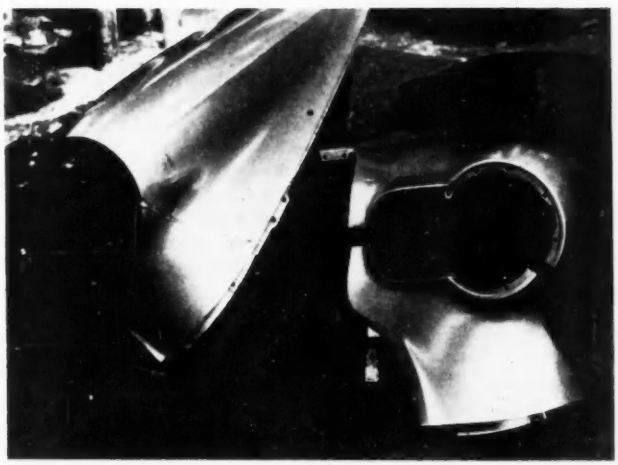
Front fender stampings are loaded into this fixture which is then closed and swung to the horizontal position for welding a seam on top of the fender. The fixture can be positioned for ease in loading and also for the operator's convenience.

to draw the section in one piece. Examples of accepted joining procedures are the coach joint and joggle lap-joint, used in joining the roof to the quarter panel and the upper rear deck extension to the quarter panel. These joints are usually spot welded, filled with body solder and finished to the proper contour. In some cases, the sheets are either butted or lapped and then brazed. The joint is subsequently depressed, filled with solder and finished to the proper contour. Very often, the engineer would prefer to make two stampings and join them by welding in order to reduce the cost of complicated dies and, also, to minimize scrap losses resulting from difficult drawing operations. However, in considering some welding processes, he may find that he has to forego welding because of inadequate strength obtainable with these methods, poor appearance of the finished product, or cost of the most acceptable method available.

Applications Heliarc Welding

Application of Heliarc Welding

The Heliarc process is inherently suited to the requirements of the automobile industry because high quality welds can be made at high speeds with no slag or spatter, a minimum of reinforcement, controllable distortion, and low cost. Other methods of welding, while they may produce sound, high quality welds at a reasonable cost and speed, do not lend themselves well to metal finishing and produce distortion beyond the limits of acceptability. The concentrated high temperature arc (approximately 6000 F) of the Heliarc process permits welding at a rapid rate with very little dissipation of heat into areas surrounding the weld. Simplicity of the torch and its limited size permit easy access to the rather confining fixtures employed with its use. Welds are of a high quality and there is no slag or spatter since the weld area is blanketed by argon gas which forms a com-

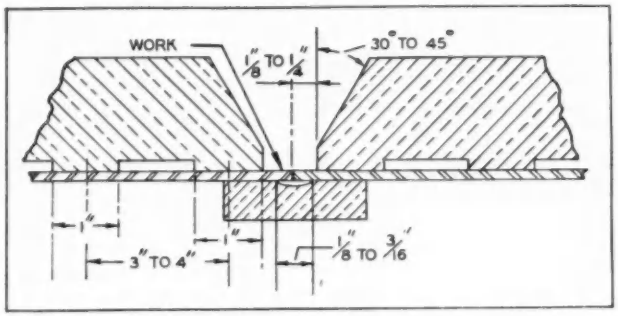


Simplification of dies for front fenders is made possible through the use of multiple stampings. This illustration shows individual stampings and a completed fender assembled by welding.

pletely inert shielding medium. The concentrated arc permits ease of controlling the weld puddle and the surface tension of the weld puddle permits ready control of the weld deposit in all positions. Accurate control of the weld deposit, of course, permits holding the weld bead to a minimum thereby permitting rapid finishing.

Typical Applications

The use of Heliarc welding in the fabrication of front fenders was one of the first applications of this process in making automobile sheet metal parts. The welded bumper is another example of the use of welding to simplify dies and stamping operations on this part. Similarly, welding makes it possible to produce a bumper guard that would be impossible to draw or stamp.



Fixture details for use with the Heliarc process.

On the body itself, a straight flat-butt weld is now being used by one manufacturer to join the upper deck extension to the quarter panels. Designs used to call for a flanged-in seam at this location, or for the joint to be brazed, depressed and filled with solder. The Heliarc weld has ample strength and can be quickly ground flush to give a smooth surface for the finish. These are some of the typical applications on automobile fenders, bumpers, bumper guards and bodies that have proved themselves economically sound under high-production conditions and are continually being expanded.

Fixture Requirements

The Heliarc process in its successful application, requires careful attention to the fundamentals of fixture design. The basic functions of a good fixture are to assure proper alignment of the parts, limit distortion, provide a back-up for the weld and maintain dimensional tolerances. In order to fulfill the aforementioned requirements of a good fixture, many points must be considered.

The upper section of the fixture clamps the parts down on the back-up bar. The pressure should be from 300 to 500 lb per lineal in. per side for material under 0.050 in. in thickness. Furthermore, this pressure should be exerted over a one-in. width along the weld line (see illustration). A secondary contact area of one in. in width is desirable, with the area between the contact areas being relieved.

Because of the nature of automobile parts, most of the fixtures will require contoured back-ups and matching contoured hold-downs. It is imperative that the fixtures be carefully spotted-in until accurate holding is obtained continually along the contact areas. Spotting-in is accomplished by the addition or removal of metal at areas indicated to be low or high upon trial clamping on actual stampings. Final spotting-in must include the actual welding of parts in the fixture to determine the location of hot and cold areas. Fixtures for completely flat work are much less of a problem since, if machining has been accurate, there should be no need for spotting-in.

Certain basic dimensions must be maintained on "hold-downs" and "back-ups" or the success of the process will be impaired. First of all, the fixture parts must be structurally massive enough to resist distortion when holding pressure is applied. Secondly, the dimensions indicated in Fig. 1 must be held, since empirical data has proven these dimensions critical.

Strength members in the fixture are open to a choice of steel plate, cast steel, or cast iron. The "back-up" bar should be beryllium copper and the "hold-downs" should be either beryllium copper or aluminum bronze. The use of copper or wear-resisting copper alloys is necessary to aid in conducting heat from metal adjacent to the weld, thereby aiding the control of distortion. Furthermore, these nonferrous materials aid in eliminating magnetic effects which adversely affect the control of the arc, prevent fusing the work to the fixtures, and provide convenient surface on which to strike the arc without "alloying" the tungsten electrode.

Hasty analysis of the fixture requirements for the process may result in the false conception that the requirements are too stringent and expensive. However, more careful consideration will reveal that if all the basic fundamentals are fully appreciated by those working on the fixtures, very little more work will be required to produce a satisfactory fixture than that required to produce one unsuitable for the process.

Equipment Requirements

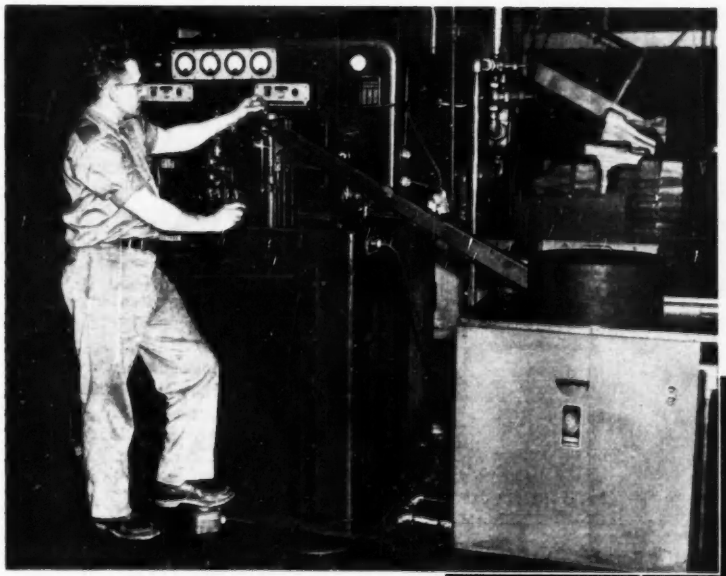
The Heliarc torch is of the utmost importance since it must be light, well-balanced, easily adjustable, trouble-free, and permit ease of access to the fixture. The torch has an electrode holder easily adjusted by a slight turn of the electrode extension cap; the water cooled copper cup is of minimum size and has a long life; the power cable is water cooled thereby permitting a maximum current of 250 amps, minimum diameter and maximum flexibility.

(*Turn to page* 60, *please*)

Hardening and Balancing

Parts for IHC's Silver Diamond Engine

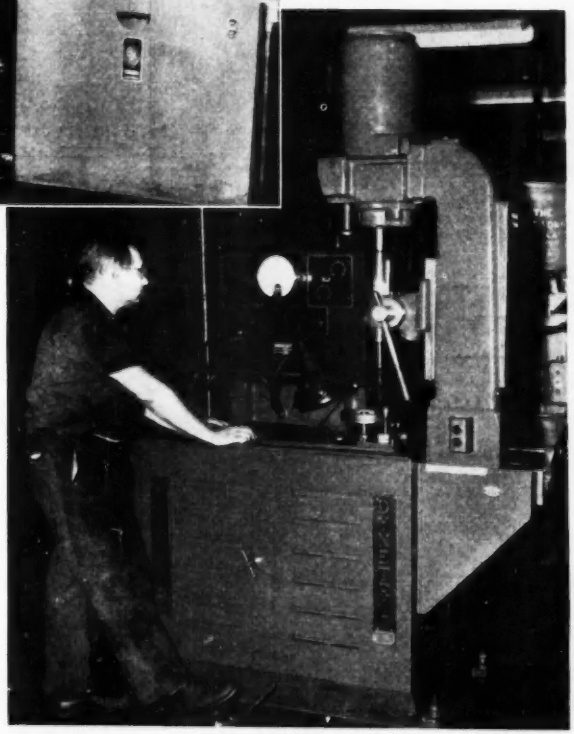
WITH the introduction of its new overhead valve Silver Diamond engine, the International Harvester Co. recently completed a major tooling program at the Indianapolis engine works. A sampling of some of the special equipment for machining cylinder blocks and heads will be published in a forthcoming issue of AUTOMOTIVE INDUSTRIES. Meanwhile, two interesting operations on detail parts are presented here to serve as an introduction.



Oil pump drive gears are hardened in this Tocco induction hardening machine at the rate of about 550 pieces an hour. After heating the gears are dropped into the chute at the right for transport to the quench tank.

First is the induction hardening of the small steel oil pump drive gear. This is done in a Tocco induction hardening machine, illustrated, at the rate of approximately 550 pieces per hour. In the operating cycle, the gear is placed on a spindle in the inductor block and heated to about 1550 F for five seconds. It is then automatically dropped down an enclosed chute

(*Turn to page 78, please*)



Cast iron camshaft gears are balanced to a tolerance of 0.2 oz in. on this Gisholt Dynetric balancer at the rate of 42 pieces an hour.

Automation Expedites Coil Spring

Revised Setup at Ford's Hamilton Plant Minimizes Handling and Helps to Maintain Uniformly High Quality. Output of 10,000 a Day Attained.

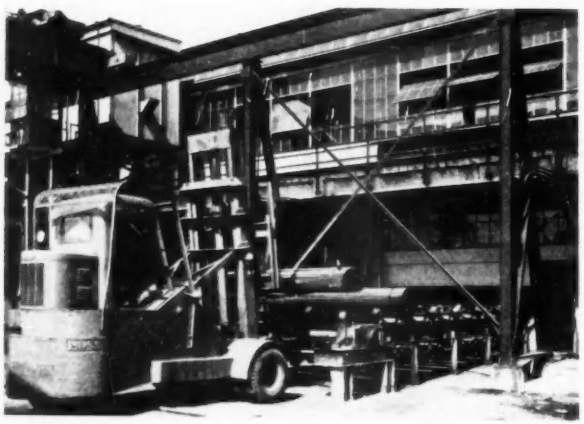


Fig. 1—Bundles of bars for producing coil springs are unloaded from cars by an overhead crane and are shifted by the lift truck here shown onto the bundle conveyor that carries them inside the building.

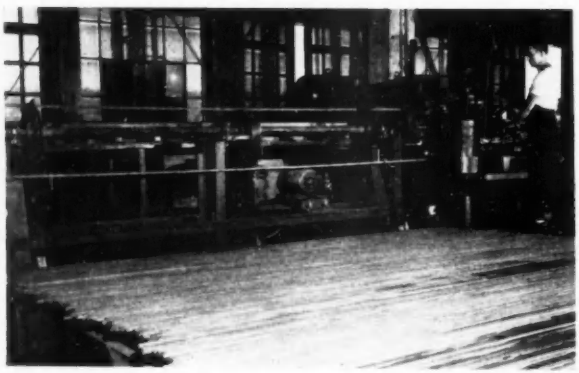


Fig. 2—Bars unbundled on the platform, foreground, roll down its inclined surface and are elevated to be fed through the Sutton automatic straightener, background.

MANUFACTURE of coil springs for Ford, Mercury and Lincoln passenger cars at the Hamilton, Ohio, plant of Ford Motor Co. has undergone almost complete mechanization within recent months. This mechanization, which the Ford organization calls "automation," has resulted in increased production of springs of better quality at an appreciable saving. In addition, jobs have been rendered safer and the saving in handling has proved very much worth while.

All coil springs produced in this plant are made from 9260 steel bars. Some of these are purchased in precision ground or in precision rolled stock of 0.703 or 0.688-in. diameter. Delivery is in bundles weighing 5000 to 10,000 lb each to a siding where they are unloaded from the cars by overhead crane and then are shifted by a heavy lift truck to a bundle chain conveyor, as shown in Fig. 1. This conveyor carries the bundles into the ground floor of the building. There, an electric hoist running on monorails delivers bundles either to storage or to a debundling platform of which there is one for hot rolled and one for bars that have been either precision ground or precision rolled.

Some hand work is required in debundling but debundled bars roll down inclines and are fed by start wheels, one at a time, onto transfer belts that move the bars longitudinally to a Sutton straightening machine, Fig. 2, and thence, either to centerless grinders or, if already precision ground or precision rolled, to a bar elevator, Fig. 3, that shifts the bars to the floor above. Bars that automatically feed through the grinders are also fed to the elevator.

There are eight Cincinnati centerless grinders arranged in pairs the first

Production

By C. R. McCormick
General Manager, Hamilton, Ohio, Plant
Ford Motor Co.

of which does rough and the second finish grinding, each removing 0.010 in. of stock. Coolant from all the centerless grinders is fed over magnetic separators that remove and collect steel particles. Grit from wheels is removed by settling and straining.

Transfer belts run continuously and are so arranged that shifts to the straightener and centerless grinders are automatically made onto transfer rolls. This transfer is effected when the end of a bar trips a trigger controlling an air cylinder which, in turn, operates levers that kick the bars onto or off the respective belts. Both the straightener and the grinders have self-feeding devices and require very little attention.

All of the foregoing equipment is located on the ground floor. One man keeps the debundling racks filled and removes wrappings and wire while part of another man's time is required to unload freight cars and transfer bundles to the bundle handling chain conveyor and from it to storage when necessary. The remaining men tend the straightener, grinders and other equipment. Bars that do not clean up in grinding are rejected and returned to steel mills as being under size limits specified. The proportion of these, however, is small.

The chain conveyor that elevates bars from the ground floor to the one above it lifts them well above the working area and then moves horizontally in such a way as to keep three end-heating furnaces supplied with bars. These furnaces are set in a row and bars feed

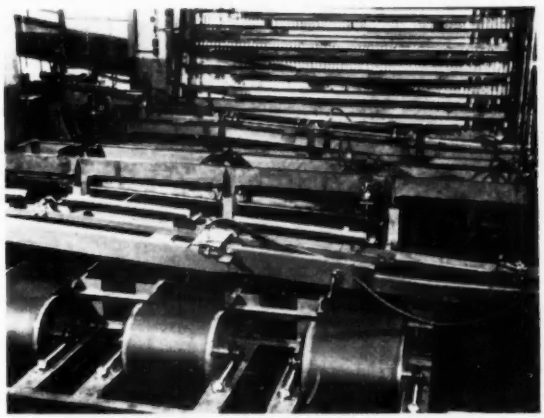


Fig. 3—Bars coming from straighteners and centerless grinders are advanced from left to right on belts in troughs and are kicked off at this station to transverse belts that load them onto the elevator, background, for transfer to the floor above.

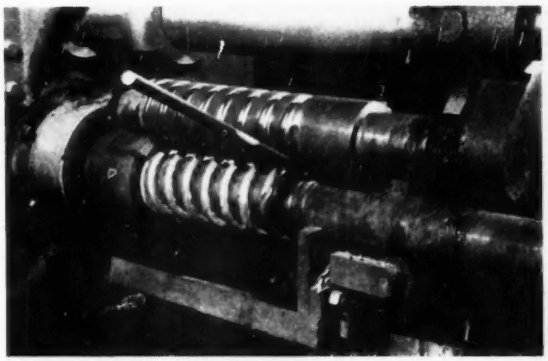


Fig. 4—After bars are heated their full length in a furnace, the flattened end is guided by hand into this Gagan coiler which automatically forms the coil and ejects it into an inclined trough.

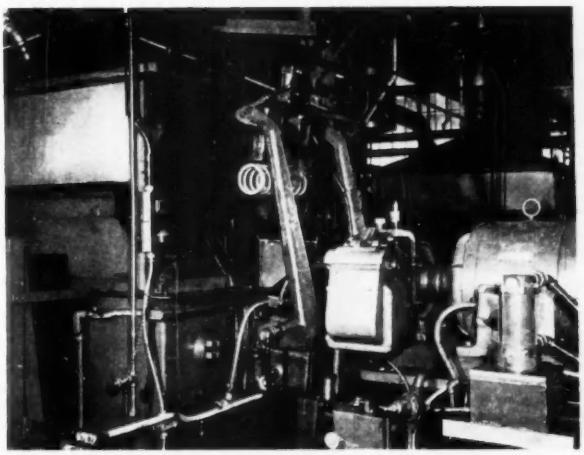


Fig. 5—This automatically operated "iron man" picks up springs as they drop from the coiler, still at red heat, and deposits them in the drum-like fixture of the Gagan quenching machine, left, for passage through quench oil.

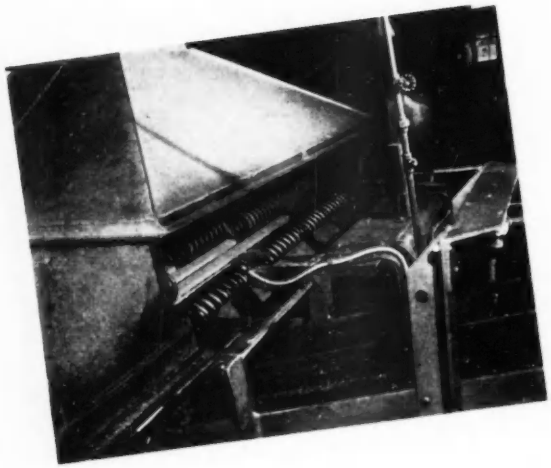


Fig. 6—Springs ejected from the quench roll down the hooded incline and are pushed off by an air ram onto the belt, foreground, for transfer onto a slat conveyor that carries them through the tempering furnace.

down a rack to supply each furnace, being kicked off the conveyor automatically as needed.

At the bottom of each rack, the bars land on pairs of cross chains moving parallel to the furnace slot in which the heating is done. Furnaces burn coke-oven gas and the temperature is so adjusted that, by the time each bar reaches the end of the slot, the 15-in. length to be heated is up to the 1850 F temperature required to swage this end. Swaging is required on only one end of the bar and is done to give this bar the flattended shape needed for the end of the spring to fit its seat properly after coiling.

Swaging is done in Ajax rotary swaging machines, Fig. 5, that also include, for each machine, a squeezer die that moves through a continuous cycle of opening and closing, and a number die, moved in similar fashion, that applies the part number on one of the flats formed. A man at each machine moves each bar in succession in such a way that it is flattened in the rolls, is then squeezed at each side of the flat portion, is again swaged to increase the length of the flat and finally is squeezed in the numbering die.

The operator then drops the bar into a trough on a chain conveyor that moves the bar longitudinally toward a furnace for heating the entire length. Each swaging operator normally handles 400 bars an hour but does no lifting, as the bars remain horizontal and are only shifted endwise short distances until finally dropped into the trough.

This forging cycle, though now manually controlled, will shortly be carried out through automation, using a mechanism that performs the same motions now made manually and making use of the same heating and forging equipment. This will save three more men but, according to present plans, will process only 300 pieces an hour, initially, per machine.

After end forging, bars dropped onto the chains are carried into one of three magazines, one for each furnace. Here bars are heated uniformly throughout their length as a preliminary to coiling. Magazines feed the bars onto the walking beams of R. S. Products Co. gas fired furnaces. The beams move the bars across the furnace hearths in $22\frac{1}{2}$ minutes during which bar temperature reaches 1750 F.

At the end of the hearth, each bar is drawn out by an operator using tongs, far enough for insertion into a Gogan coiling machine, Fig. 4, which has a rotating arbor above which is a live roll with a helical groove of the same pitch as the coil to be produced. Roll and arbor are geared together and draw the bar out of the furnace as the coil is formed around the arbor in contact with the groove.

As soon as the complete bar is coiled, the arbor is automatically withdrawn and the coil stripped off,

(*Turn to page 76, please*)

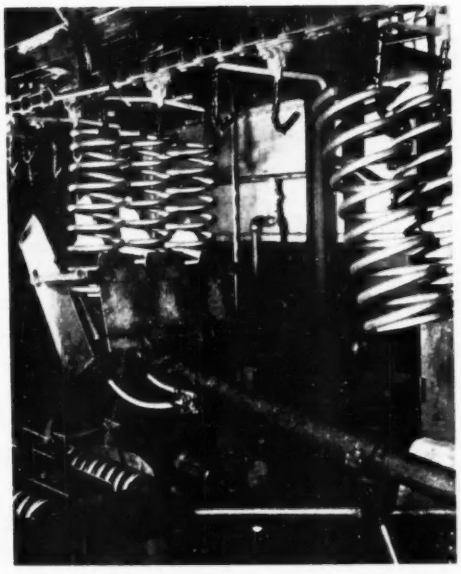
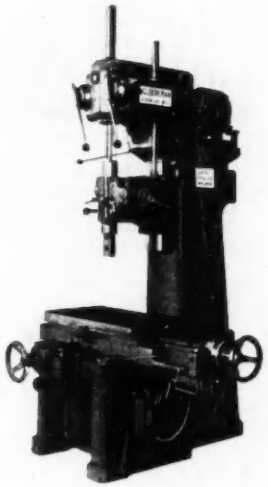


Fig. 7—When springs leave the Wheelabrators, they are advanced to this station on a belt, lower left corner, and drop into the cradle, here shown elevated. In this position, the springs are picked up automatically by hooks on the overhead chain that carries them through a paint dip and baking oven.

E-89—Layout Drilling Machine

A new layout drilling machine placed on the market by Cleereman Machine Tool Co., Green Bay, Wis., is designed to handle that class of work which requires more accuracy and facility than



Cleerman layout drilling machine

possible with a drilling machine and yet does not require the extreme precision of a jig borer. The machine is said to have extreme convenience for drilling, boring, tapping, reaming, milling and similar operations. It is especially applicable to tool work, plastic, rubber or die casting molds, and to blanking, punching, forming and drawing dies within its designated limits, not to mention experimental work and jigless production of small lot manufacturing.

The layout machine has a combination boring and drilling spindle with No. 4 Morse Taper with lifetime lubrication. Preloaded ball bearings are used at the nose end with an upper steadying ball bearing and a coupling type connection between the spline shaft and the spindle in the top of the quill. The spindle quill is chrome plated and the rack is ¼ pitch. The tang slot has a hardened steel insert. A spindle binder on the sliding head and a retaining key slot in the spindle nose provide for milling operations. The sliding head has a friction type feed clutch with automatic adjustable depth "kickout," and the spindle is counterbalanced to eliminate backlash between the spindle feed rack and pinion.

The movements of the saddle and table are controlled by hardened and ground precision lead screws accurate to 0.0001 in. in any inch and a cumulative error not to exceed 0.001 in. in 24 in., with 6-in. diam micrometer dials graduated to 0.001 in. and verniers to 0.0001 in. With screws of this accuracy and the alignment tolerances held on the machine, work tolerances can held within 0.001 in. per ft.

Reference scales graduated to eighths with adjustable pointers for quick, convenient reference, and "one shot" lubrication system for table, saddle and bed mechanism are among the features. Power rapid traverse to table movements is optional. Automatic safety stops are provided at the extremes of travel.

NEW
Production and Plant
EQUIPMENT

For additional information please use coupon on page 56

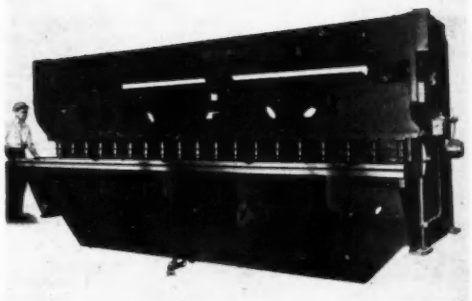
E-90—Shear of 18 Ft. Capacity

The longest Steelweld shear built by the Cleveland Crane & Engineering Co., Wickliffe, Ohio to date has a shearing capacity of 18 ft of 3/16 in. mild steel at 50 strokes per min. Operating on the pivoted-blade principle, the blade travels in a circular path without guides and slides.

Ball bearing transfers are provided in the bed, facilitating movement of steel through the knives. A motor-operated back gage with slow and fast control buttons permits easy positioning of material to be cut. The back gage indicator reading in inches and 1/64ths is seen through an oblong slot in the hold-down beam. Operator need not walk to end or rear of shear to adjust this gage.

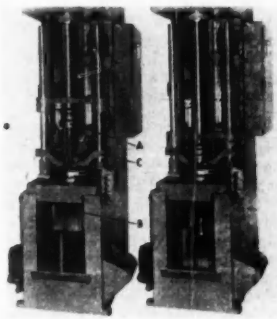
The shearing action is controlled by an electrically-operated foot switch which is movable about the floor. Frame and blade are of all-welded steel, one-piece construction with the heavy bed extending below the floor. The bed and crown are welded to the end housings forming an integral unit.

Knife clearance is adjusted to suit thickness of plate being cut by turning a handcrank and observing a large dial indicator.



Cleveland Crane 18 ft capacity Steelweld shear

E-91—Broach Handling Mechanism



Automatic broach handling mechanism available with Colonial presses. Equipment consists of an hydraulically operated broach receiver located in the base of the press, and an automatic puller

Automatic broach handling equipment is now available on the complete line of standard presses ranging from 4-ton, 24-in. stroke to 10-ton, 36-in. stroke manufactured by the Colonial Broach Co., Detroit, Mich. These new completely automatic accessories are said to provide higher production rates and also reduction in accident hazards.

A typical application on a Colonial Utility Press is illustrated. The job of this press is the finishing of case-hardened gear splines. The machine is a standard 6-ton, 36-in. stroke. The broach handling mechanism consists of an automatic release type puller (A) and a lower receiver (B). In the left hand view the broach is at the top of the stroke, ready to start the cut. As

the broach is pushed through the gear, its pilot contacts the broach receiver, forcing it down against a slight hydraulic pressure. At the finish of the stroke (right hand view), two trip dogs (C) cause the broach puller (A) to release the broach, and the receiver lowers the broach, clear of the work.

After the finished part is unloaded, hydraulic pressure raises the broach receiver and broach and thus automatically reinserts the broach into the puller. The machine now returns to the starting position, ready for broaching the next gear. A swinging fixture is also used here. Fixture operation is interlocked with the machine cycle. A separate control is provided to permit independent operation of the lower broach handling mechanism for set-up.

NEW Production and Plant EQUIPMENT

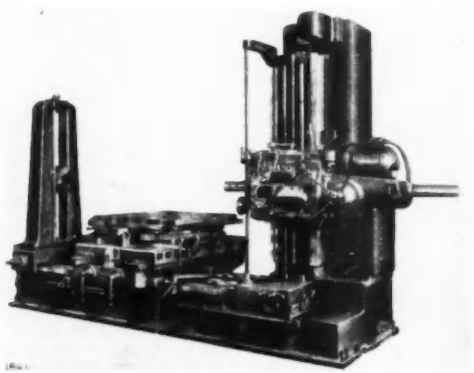
For additional information please use coupon on page 56

E-92—Boring, Drilling and Milling Machine

A new horizontal boring, drilling and milling machine has been placed on the market by the Cincinnati Gilbert Machine Tool Co., Cincinnati, Ohio.

Features of this machine are a single hardened 3½-in. diam spindle with maximum spindle speeds of 1420 rpm; built-in reversing motor equipped with anti-friction bearings with the spindle sleeve mounted on pre-loaded zero precision ball bearings; hardened ways for the bed; pressure lubrication to all running parts; centralized control for all spindle speeds, feed changes, and feed selection; power rapid traverse, starting, stopping and reversing of spindle and all feeds.

Built-in rotary table is not an accessory but an integral part of the machine. The table unit has a cross feed and power rapid traverse on its saddle. Table top is clamped to its base by a 47-in. diam ring clamp acting on an angular surface of the table top. This clamp is closed by a screw which in turn is actuated by a ratchet handle. The table top is mounted on a large diameter anti-friction bearing and is centered on a large diameter king pin equipped with opposed tapered roller bearings. Flat ways are lubricated by a pressure system. Furnished with a working surface of 44-in. diam. or 44-in. square and surrounded by a coolant trough, the table top is graduated to read in ½ deg and can be equipped with precision indexing device.



Built-in rotary table type horizontal boring, drilling, and milling machine produced by Cincinnati Gilbert

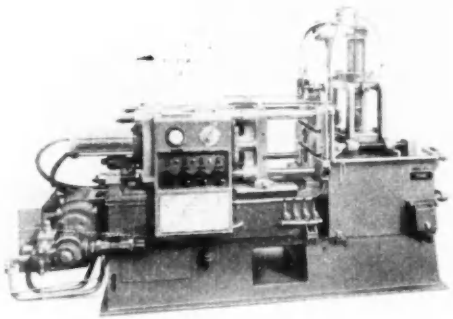
E-93—Die Casting Machine

The new model 50 die casting machine designed and engineered by the Cleveland Automatic Machine Co., Cincinnati, Ohio, to provide a small high pressure hydraulic machine in the low-cost field, can be furnished either as a cold chamber machine for casting aluminum or as a gooseneck type machine for casting zinc, tin or lead. One shot end can be quickly removed by any machinery handling crew and changed to the other type. This model 50 can produce aluminum castings up to 2½ lbs., and zinc castings up to 4 lbs. Free cycle time is well over 1,000 shots per hr.

The Model 50 diecasting machine has die plates 22 in. by 18 in. and four tie bars 2 in. in diam. Space between tie bars is 16 in. by 12 in. and the die opening is 8 in. An estimated 50 tons locking pressure is obtained through a toggle mechanism similar to the larger size Cleveland diecasting machines.

Either automatic controls or manual controls can be supplied. Automatic controls are flexible, fool-proof and electrically operated and can be timed to the exact diecasting cycle desired. These controls can be operated manually, for set-up purposes, when the selector switch is set for manual operation.

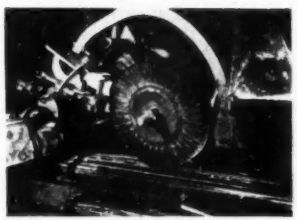
The Model 50 Machine is equipped with a Vickers two stage pump driven by a 10 hp direct connected motor.



Cleveland die casting machine, model 50

E-94—Power Brush Section

By using a new power brush section produced by the Osborn Mfg. Co. of



Buff brush operation, part of an Osborn power brush section developed for use in the manufacture of stainless steel division bars for automobile windows.

Cleveland, Ohio, a large producer of automotive parts is said to have increased production of stainless steel division bars for automobile windows to over 6,000 a day. An Osborn Monarch Tampico Section is used to smooth out polishing marks, brighten and prepare the surface for final color buffing.

The equipment used is a 14-head inline. The automobile window divider bar is placed in a holder which moves on a continuous chain through the polishing line. The first four heads are Osborn Monarch Tampico brushes used with abrasive. The last three stations are buffs run at 4,000 revolutions per minute with sprayed abrasive.

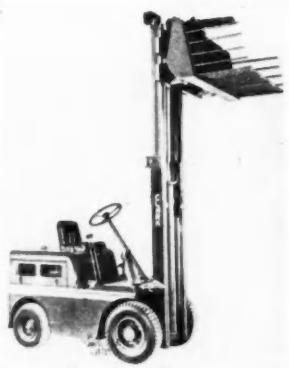
At this point, the divider bar is finished on one side. The holder automatically rolls over and moves under the second set of seven heads so as to polish the other side. At the end of the line, the bars are removed and placed on a conveyor rack which carries them through a Solventol bath. The parts are then dried and masked to prevent surface injury.

F-129—Grading Fork Attachment

A gravity-dump grading fork attachment for fast, safe handling of bulk materials too large to pass through a 2½-in. screen, has been introduced by Clark Equipment Company's Industrial Truck Div., Battle Creek, Mich.

The attachment is applicable to all models of Clark fork-lift trucks of 2000 lb capacity and up, and interchangeable with standard forks and attachments for mounting on standard uprights or Clark's Hi-Lo-Stack.

Having ¾-in. diam removable tines spaced on one-in. centers, the grading fork is of heavy construction with ¼-in. steel plate mounted on a fixed plate of ¾-in. hot rolled steel. When the load is raised the fork locks in position, and the load is dumped when released by a 15-lb pull. A pneumatic snubber minimizes the shock and strain of dumping.



Clark grading fork attachment for fork lift trucks

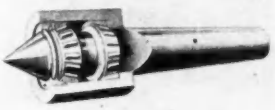
NEW ★ PRODUCTS

For additional information please use coupon on page 58

F-130—Live Center

A live center produced by Scully-Jones and Co., Chicago, Ill., is adaptable for heavy loads at high speeds in lathes and other machines. Two matched standard Timken tapered roller bearings with eccentricity points aligned, a threaded retainer ring with grease seal to pre-load bearings, shank induction hardened and precision ground, and an alloy steel spindle hardened to 64 Rockwell C are features of the Scully-Jones live center.

It is available in numbers two and three Morse taper sizes with load-carrying capacity to 1000 lb and in numbers four and five Morse taper sizes with capacity to 2400 lb.

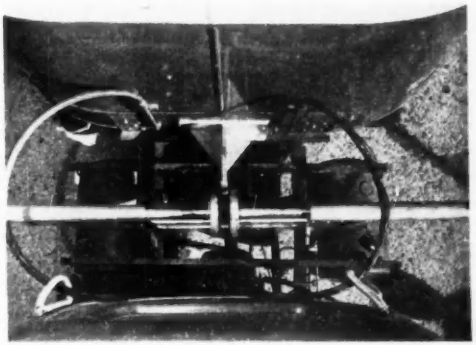


Scully-Jones live center

F-131—Tractor-Trailer Stabilizer

A newly formed company, Automotive Safety Devices, Inc., Holly, Mich., has introduced a new hydraulic stabilizing device, Wakeman stabilizer, in one of the latest approaches to the problem of preventing jack-knifing of tractor trailer combinations.

The stabilizer consists primarily of a heavy thrust shaft with pistons on both ends which slide into two opposed hydraulic cylinders. Two disks are affixed to the shaft at the center to form a groove which engages a steel nose plate mounted on the trailer. Ports at the outer ends of the pistons are connected through a system of plumbing which leads to a metering valve on the dash of the truck and also to a locking valve on the floor of the cab. The whole assembly mounts transversely on the tractor just back of the cab and is attached with two ¾-in. bolts.



Downward view on installation of the Wakeman stabilizer, manufactured by Automotive Safety Devices.

In operation, the unit provides a controlled snubbing action in the same fashion as a hydraulic shock absorber. Movement of the trailer on turns or in a skid cause the shaft to move laterally against oil pressure which can be regulated through the dash valve. Oil displaced by the piston moves through the lines to the opposing cylinder. The entire assembly can be locked by holding down the foot locking valve, which prevents oil from passing through to the opposite side.

Total weight added to the truck is approximately 130 lb.

F-132—Rust-Preventing Vapored Carton

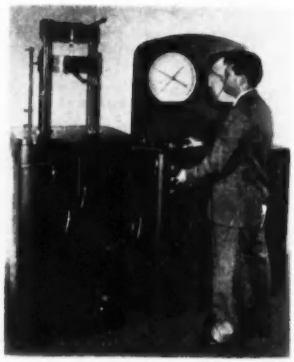
A method is said to have been perfected by Nox-Rust Chemical Corp., Chicago, Ill., for impregnating chipboard and corrugated cartons with the Nox-Rust Vapor Wrapper chemical.

This development is for packaging all types of metal parts, tools and appliances. An invisible vapor released within the container prevents the for-

mation of rust on metal. In conjunction with Nox-Rust Vapor Wrapper paper in rolls and sheets, the carton development permits giving any type of metal product, of any shape or size, complete protection against rust, according to the company.

F-133—Universal Testing Machine

Development of an improved, low-cost universal testing machine, model 60-H, of 60,000 lb capacity with two ranges is disclosed by the Baldwin Locomotive Works, Phila., Pa. Designed like larger Baldwin machines with hydraulic loading unit separate from the indicating and control unit, recoil from breaking



Baldwin 60,000 lb capacity testing machine, model 60-H

specimens is isolated and maximum or lazy hands can be adjusted with minimum drag. The two-unit design also permits varying their relative positions to suit any requirement.

Load is applied by an integrated piston and elevating cage consisting of the table, two uprights and upper gripping head, all of which have a six-in. stroke. The lower gripping head is the upper member of a second, adjustable cage including two long columns and lower crosshead supported by a vertical screw extending downward from the closed end of the hydraulic cylinder.

A motor-drive for positioning the lower gripping head within the loading cage, is also a new feature as standard equipment for this class of machines. The motor-drive, including worm gear and nut on the adjusting screw, is mounted on the lower crosshead, giving a range of 17 in. at 10 ipm.

Loading controls giving infinitely variable speed between nought and two ipm, are located on the table of the control cabinet. The flow of oil to the cylinder is controlled by a directional control valve for up and down motion and two valves, for course and fine control of testing speeds. Automatic safety devices protect gages against overloads and prevent over-travel of moving parts.

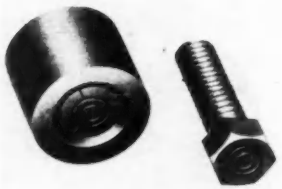
Vertical distance between gripping heads may be one to 18 in., the latter including the stroke. Clear lateral space between columns is 10 in. The table is arranged for transverse testing and is drilled to secure standard transverse tools at spans of 12, 18 and 24 in.

NEW ★ PRODUCTS

For additional information please use coupon on page 56

F-134—Bolt Heading and Marking Hammers

Combination bolt heading and marking hammers of solid carbide for automatic bolt heading machines are now available from Carboloy Co., Inc., Detroit, Mich. The new hammers permit elimination of separate marking operations frequently performed in manufacture of bolts, rivets, etc. Simultaneously with the heading operation, manufacturers can mark bolts, screws, and rivets to indicate size or analysis of metal, or both, during the heading operation.

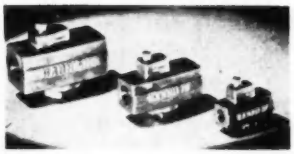


Carboloy combination bolt heading and marking hammers

The new combination heading hammers are offered in addition to the plain solid carbide types offered by Carboloy. Heading hammers with markings are available with either male or female markings and in a complete range of sizes. Any pattern, numerals, combination of lines, or other markings can be furnished.

F-135—Speed Control Valve

Announced by Hannifin Corp., Chicago, Ill., a new speed control valve for pneumatic cylinders employs a guided poppet of ample diameter to allow full, pipe-size flow toward the cylinder. It provides metered flow away from the cylinder by means of a large-diameter, tapered, valve stem which is threaded to permit sensitive adjustment from nought cfm to maximum capacity.



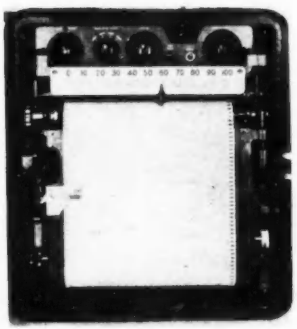
Type S speed control valves manufactured by Hannipin Corp.

An "O" ring seal above the threads on the metering valve stem provides a safety feature that warns the operator when the point of maximum adjustment has been passed.

Construction of type S valves is entirely of corrosion-resistant materials and suitable for use on pressures up to 150 psi. The poppet is faced with synthetic rubber to provide a positive seal and is loaded with phosphor bronze spring. All parts are readily accessible for inspection without breaking line connections.

F-136—Strip-Chart Strain Recorder

A new strip-chart strain recorder for use in stress analysis with SR-4 bonded resistance wire strain gages is offered by Baldwin Locomotive Works, Phila., Pa. Features of the new recorder are easy readability with a 9½-in. wide chart scale, two chart speeds of six and



Baldwin new strip-chart strain recorder for SR-4 strain gages.

180 in. per hr, and accommodations for a two-arm and four-arm strain bridge. Slowly varying strains can be recorded for as long as 10 days without changing the chart.

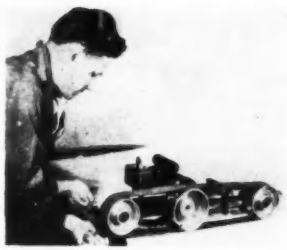
The instrument is a special adaptation of the Leeds & Northrup Speedomax type G, model S recorder with simple adjustments for strain gage characteristics, strain ranges, and for the Wheatstone bridge circuit. Basically the circuit is a dc potentiometer type for measuring the output of a strain gage bridge.

An important feature of the circuit is the arrangement for directly standardizing the potentiometer range in proportion to the voltage supplied to the strain gage bridge. The circuit is adjusted by means of a two-position bridge supply switch and by a rheostat calibrated in gage resistance from 50 to 500 ohms. Microinch ranges of the recorder are 1000, 2000, 5000, and 10,000 on a six-volt bridge and 2000, 4000, 10,000 and 20,000 on a three-volt bridge. Continuous gage factor adjustment covers the range from 1.7 to 2.2. A zero adjustment control and range extender switch provide approximately plus or minus 15,000 microinches per in. movement of the balance point with 120-ohm gages. Response to full scale unbalance is approximately 3 sec.

F-137—Angle-Setting Belt Grinder

A belt grinder, the Expeditor, which can be set at any angle has been developed by H. L. Ramsay & Co., La Grange, Ill. Mounted on an axis that centers at the motor shaft, it requires one turn of a clamp nut to set the abrasive belt at a given angle. Several units can be set above each other so that the contact wheels or platens may be directly in front of the operator. In this set-up the worker can rough, semi-finish and finish grind.

Designed for free belt operation, form wheel work, contour grinding, line contact grinding when much stock is removed, and for platen precision grinding either above or below, this expeditor can be quickly set up or reset for these and similar operations.



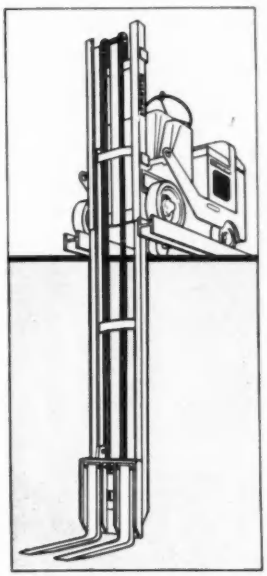
Expeditor belt guide developed by H. L. Ramsay & Co.

NEW ★ PRODUCTS

For additional information please use coupon on page 56

F-138—Elevator Fork Lift Truck

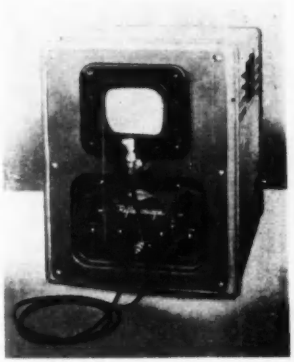
Believed to be the first development of its kind, this new Elevator fork lift truck, produced by Towmotor Corp., Cleveland, Ohio, lowers and raises heavy loads between balcony storage areas and first floor production lines. Special non-tilt mast and carriage assembly were designed to permit the load carrying forks to be lowered 98-in. below balcony floor level. Mounted on a standard Towmotor fork lift truck, the elevator unit has a lifting and lowering capacity of 2000 lb. Full capacity loads can be lifted from the first floor to 10 in. above balcony floor level. The Elevator truck can be built in various capacities and heights-of-lift.



Towmotor elevator fork lift truck

F-139—Ultrasonic Metal Tester

Reflectoscope, a portable ultrasonic instrument for testing metals, has been brought out in a new model, type UR, style 50E351, by Sperry Products, Inc., Danbury, Conn.



Sperry Reflectoscope, type UR, style 50E351

Besides an improved pattern of square- wave inch markers on the horizontal axis of the screen and a new reject control for facilitating interpretation of test results, it also features functional changes in styling and exterior design.

Fundamentally, the instrument consists of a pulse-generator, and a crystal transducer or searching unit that converts electrical energy to ultrasonic energy. The searching unit also converts reflected ultrasonic energy to electrical energy and returns it to an amplifier which causes an indication on a cathode-ray tube. A sweep generator is included to provide a time base for the cathode-ray tube and a marker generator produces a square-wave trace to furnish a measure of distance.

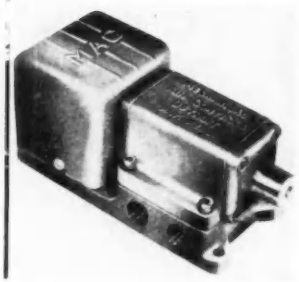
The Reflectoscope is used for testing steel billets, forgings, castings, finished stock, and a variety of machined parts. It is also possible to test welds in steel plate, pipes and containers.

F-140—Paint Spray Air Hose

A long length braided construction air hose specifically for use as an air line in paint spray equipment is a product of the B. F. Goodrich Company, Akron, Ohio. Light and flexible to reduce drag on the spray operator, the hose has a red cover of tough age-resisting stock. Its smooth mold finish reduces tendency to accumulate paint and dirt. Strong cotton reinforcement and a special air hose tube are said to form a balanced construction suitable for working pressures up to 150 lbs.

F-141—Solenoid Air Control Valve

Mechanical Air Controls, Inc., Detroit, Mich., announce addition of a 4-way, 5-port, two-pressure solenoid operated air valve to their line. This MAC air valve has two inlet ports which allow full line pressure to be applied to the work stroke of an air cylinder and a much lower pressure to be applied to the return stroke. High or low pressure can be applied to either inlet port, and pressures can be reversed at the option of the operator. Pressure range is from 20 to 150 psi and the valve is available in $\frac{3}{8}$-in. and $\frac{3}{4}$-in. pipe sizes.



Air control valve offered by Mechanical Air Controls

MAC patented "O" ringtype seals give a sealed-with-air-pressure feature of the poppet type valve, and yet maintain the ease of operation of the direct solenoid balanced type valve. The assembly consists of an iron base, bronze body with retainers, solenoid with cover, and the chromed aluminum piston which is the only moving part. All wearing surfaces are hard chromed.

F-142—Blast Cleaning Steel Shot

American Wheelabrator & Equipment Corp., Mishawaka, Ind., has announced development of Tru-Steel shot for use in all types of blast cleaning equipment. This new material is a genuine true steel that has received a full heat treatment and exhibits that combination of hardness and toughness generally associated with steel.

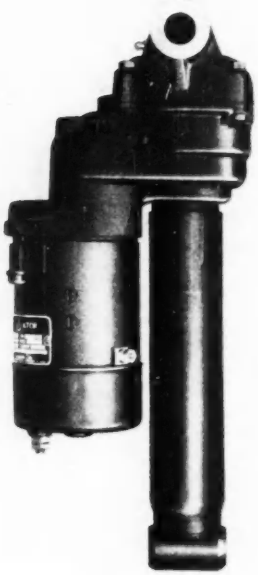
The following advantages for Tru-Steel over earlier chilled iron abrasive are listed by the company. The useful life of the shot is much longer than that of chilled iron—with less to buy, store and transport. It wears down and does not break down—with no possibility of fragments imbedding in soft work. It reduces wear on the blast cleaning equipment, cleans at least as fast as chilled iron, and provides lower cost per ton.

NEW ★ PRODUCTS

For additional information please use coupon on page 56

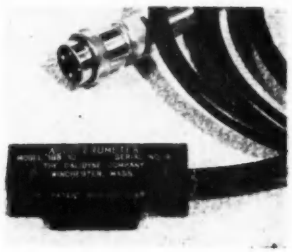
F-143—Electric Actuator

The Delco Products Div., Dayton, Ohio, of General Motors presents the Delco electric actuator, which is now used on the White 3000 series truck to tilt the cab forward for gaining access to the engine and front end parts of the truck. The complete operation of either tilting the three-man cab over the motor or lowering it back into position can be performed in 15 sec. The actuator is a combination of a high speed motor geared to a ball-bearing, screw-jack which converts rotary motion into linear motion.



Electric Actuator produced by Delco Products

F-144—New Design Pickup



Calidyne accelerometer, Model 18

Exceptional sensitivities and natural frequency ranges are characteristic of a new design pickup, the Model 18 accelerometer, allowing direct operation of voltage and current sensitive indicators and recorders to higher frequency ranges than before possible without complicated amplifying equipment.

Standard pickups, cased and protected against overload shocks, weigh two oz; special designs, uncased, weigh only 5 gr. Pickups having natural frequencies from 80 to 450 c.p.s. have a corresponding range of sensitivities from 15 to 0.21 volts per gravity acceleration, and acceleration ranges from 1 to 70 g. Natural frequencies as high as 1700 c.p.s. are obtainable.

The accelerometers are DC-operated, and can furnish as much as 400 microamps into 1000 ohms impedance or 20 volts into 1 megohm at full range output without amplification.

F-145—Leaded, Free Machining Steel

Joseph T. Ryerson & Son, Inc., Chicago, Ill., is again marketing a leaded, free machining steel named Ledloy, production of which during the war and postwar periods was curtailed. Tests are claimed to indicate Ledloy to be the most machinable steel available in the United States, according to the company.

It is said that the open hearth screw stock now being produced machines from 30 per cent to 50 per cent faster than AISI B1113 which has long been accepted as the fastest cutting screw steel. Furthermore, it is said that cutting tools last from 50 per cent to 200 per cent longer between grindings.

According to the Ryerson company, Ledloy machines to a smoother finish than other free cutting screw steels, and provides a better base for plating. As Ledloy is an open hearth steel, it has good strength and ductility and will carburize better, with a sounder cross section than free machining Bessemer steels, the company further declares.

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GRIPS FEET LIKE A GEAR TOOTH
PREVENTS COSTLY SLIPS AND FALLS
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AIRBRIEFS

By ROBERT McLARREN

Last of the Wings

Another case in point is the recent decision to cancel the last of the Northrop "Flying Wing" aircraft (although one more will be delivered). Certainly there are few technical arguments on which more comprehensive data have been assembled than that of the all-wing aircraft. As an extremely close student of this development through the years, perhaps a prejudice has crept in of which we are unaware. But on the basis of all the facts, it is difficult to understand how this development could have been summarily dismissed. The conclusion that the decision was not based on the engineers' reports seems inescapable, at least to this observer. It now appears certain that the all-wing aircraft is finished as a continuous development because of this action.

Technical Management

It is difficult to reconcile this assumed decline of technical authority with recent personnel studies which indicate that today a greater percentage of manufacturing management is technically trained than ever before. The answer, of course, lies in the tightening economic situation under which circumstances the sales department has always come to the fore. It is essential to sell the product, regardless of the fact that customer demand may be overwhelmingly for something that is uneconomic, decadent or of proved inferiority to that of which the engineer is capable. Thus, persistent Air Force demand for a strategic bombing force has placed the B-36 in quantity production, British Ministry of Supply demand for a vast array of turboprop and turbojet aircraft has produced the galaxy of new British types, continued U. S. airline insistence on schedule reliability has retained the standard engine-driven propeller transport in service, etc. Technical progress must always await such demands, they never lead it in periods of economic stress. Perhaps the engineer finds full self-expression only in periods of prosperity.

Unscientific Science

The National Advisory Committee for Aeronautics, Government aeronautical research agency, has long held world-wide pre-eminence in its field. We are used to thinking of Bessel functions and accuracies to one-millionth or so when we think of the NACA. Now, however, we are confronted with the fact that they recently crashed a full-scale airplane in order to study the crash fire problem! The NACA Lewis Flight Propulsion Laboratory started the engines on a Curtiss C-46 transport, pointed the plane towards a barrier, the crew left the airplane, and it was sent to its destruction while cameras and recording instruments ground away. The experiment was directed by L. A. Rodert, 1946 Collier Trophy Winner (for icing research!), who explains that after two years of careful study of the problem his committee of experts concluded this was the only satisfactory way of finding out how fires start, how they spread and how they can be prevented in aircraft! But Rodert is an old hand at getting directly at his research problems. He solved the problem of aircraft ice prevention by flying through icing conditions in a big transport for hundreds of hours. While such direct methods may not stimulate theoretical mathematicians, it at least gets the job done and that's the purpose of research, regardless of the methods used.

The Serious Helicopter

Despite the truly remarkable record of accomplishment of the helicopter in specialized fields, it is still fair to regard it as something of a "fringe" operation outside the main stream of aviation. But the signs are brewing that it has reached a stage of maturity qualifying it for entry into the main stream. For the next stage in helicopter history, the passenger transport, is hovering near. Bell Aircraft has revealed a 13-place version of its model H-12, which it calls the "Feeder-Liner." Sikorsky has announced a 12-passenger commercial model priced at about $120,000. Piasecki has prepared a commercial version of its "flying banana" to carry 10 passengers and sell for about $150,000. Reason for this unfolding of the ultimate helicopter future is the "New York Area Helicopter Case" currently before the Civil Aeronautics Board. The CAB is studying a long list of applicants for helicopter service in the Metropolitan area. Los Angeles Airways, which has brilliantly pioneered helicopter mail service in the Los Angeles area, is now seeking extension of its service to include passenger-carrying. The New York Port Authority has stated that 10-place passenger helicopters will be in service by the end of 1950 and even hints at a 40-place helicopter "now in the process of construction." The record of the helicopter, beyond all question, proves that it is technically ready for this next, and final, phase of its career. When the passenger helicopter becomes a reality, then the "door-to-door aerial bus service," so long promised, will become the privilege of the citizen. And it now appears to be close at hand.

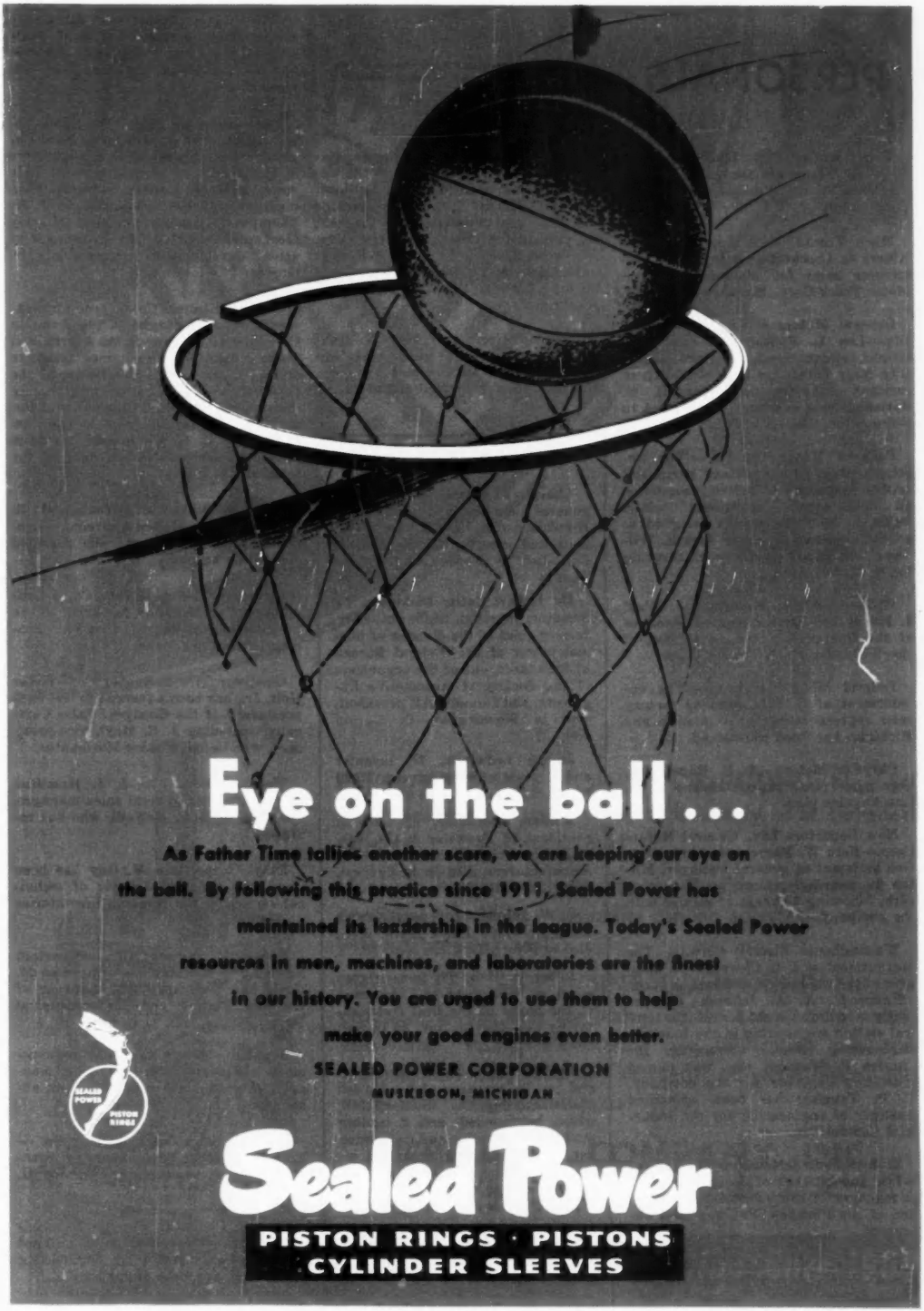
Turboprop Fine Points

While the impact of the British jet transports continues to claim the center of the stage, there is an equally vociferous argument proceeding among engineers over the merits and demerits of the turboprop power plant. In this field also England holds the center of the stage, notably with her Viscount and Apollo. As is the case with the jet airliner, many air-minded people ask: "Why don't we have any turboprops?" But here the answer is different. Most engineers go directly to the problem of the turboprop engine and begin laboriously pointing out its many admirable features. We think the answer lies not in the engine but in the turboprop-powered airliner. We are often told the turboprop is the "next stage" in the progression from reciprocating to turbojet power. But it is our conviction that the United States will not pause at this interim step but will proceed directly from the reciprocating to the turbojet engine in airliner power. Apparently 500 mph has been generally agreed on as the dividing line between the turboprop and the turbojet in efficiency. We are already cruising our transports at much better than 300 mph and have the means at hand to cruise them at 500 mph. Obviously, it would be wasteful to insert in between these two another power plant with its attendant high cost of development, service testing, maintenance, etc.

Facts vs Decision

However, the engineer is rapidly losing his standing as the arbiter of technical decisions. Despite the rapid gains the profession made during the war in stature and skill, recent events create the indelible impression that his facts and figures are being more often brushed aside than ever before. The problem of the turbine-powered airliner is a case in point. There can be little question that given unlimited funds and time any type of power plant can be developed to a point making it economically practical. Such development completely disrupts all the available facts and figu.es. It is possible, on the basis of presently available

(*Turn to page 72, please*)


Eye on the ball...
As Father Time tallies another score, we are keeping our eye on the ball. By following this practice since 1911, Sealed Power has maintained its leadership in the league. Today's Sealed Power resources in men, machines, and laboratories are the finest in our history. You are urged to use them to help make your good engines even better.
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PISTON RINGS
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PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Ford Motor Co., Lincoln-Mercury Div.—**A. J. Lapointe** has been appointed manager of the Process Engineering Laboratory.

Mack Trucks, Inc.—Appointment of **Albert G. Crockett** as manager of distributor sales for Mack-International Motor Truck Corp., has been announced.

General Motors Corp., Fisher Body Div.—**Leo L. Rosshirt,** formerly assistant resident manager of the Kansas City Body Plant, has been promoted to resident manager, succeeding **H. D. Burnside,** who has been transferred to Wilmington, Del.

Packard Motor Car Co. — The appointment of two assistant parts and service managers to actively supervise all field service operations include **David S. McNally** who is assigned to zones in eastern U. S. and **Jack K. Williams** who heads up all zones covering the western states.

Willys-Overland Motors, Inc.—**Paul J. Havas** has been appointed manager of the foreign distributors division of the Willys-Overland Export Corp.

Federal Motor Truck Co.—The appointment of **C. H. Cowan** as factory sales representative for Wisconsin and Michigan has been announced.

Chrysler Motors—**A. H. Rogers** has been made plant superintendent of the Los Angeles plant.

New Departure Div., General Motors Corp.—**Ferd W. Marschner,** administrative assistant to general manager, **Milton L. Gearing,** retired on November 30th, following 35 years of service with the company.

Westinghouse Electric Corp. — The appointment of **J. O. Clevenger** as manager of the welding department has been announced. **A. A. Johnson** was recently appointed manager of the central station engineering in the Industry Engineering Dept., succeeding **Dr. Charles F. Wagner,** who was named consulting engineer for the company. **F. P. Taugher** has been appointed manager of engineering for the Industrial Control Div.

E. I. duPont deNemours & Co., Inc. —The appointment of **Joseph B. Dietz** as manager of the industrial sales section of the Finishes Div., has been announced.

The Natl. Machine Tool Builders' Assoc.—**David Ayr,** president and general manager of the Hendey Machine Co., is the new president of the association, following his election at the annual meeting. **Richard E. LeBlond,** president, The R. K. LeBlond Machine Tool Co., and **Frederick S. Blackall, Jr.,** president of the Taft-Peirce Mfg. Co., were elected 1st and 2nd vice-presidents. **J. A. Raterman,** pres. of Monarch Machine Tool Co., was elected treasurer.

Northrup Aircraft, Inc.—**C. N. Monson,** executive vice-president, has resigned. **Joseph M. Druliner** has been appointed chief industrial engineer.

Necrology

Charles J. Heale, 49, president, general manager, and publisher of *Hardware Age,* and a vice president and director of the Chilton Co., died in New York City on Dec. 1.

Dr. Hobart Cutler Dickinson, 74, inventor, physicist, traffic authority, former chief of the division of heat and power of the Federal Bureau of Standards, one of the organizers of the Society of Automotive Engineers, and former SAE president, died in Washington, D. C., on Nov. 27.

Joseph Ledwinka, 79, inventor and former chief engineer, Budd Co., died in Philadelphia on Nov. 26.

William Brewster, 83, former president of Brewster & Co., carriage builders and automobile body manufacturers, died in Bridgeport, Conn., on Nov. 25.

C. W. Jacobs, 53, general service manager, GM's Buick Motor Div., died in Flint, Mich., on Nov. 30.

Julius P. Heil, 73, former governor of Wisconsin and chairman of the board of the Heil Manufacturing Co., died on Nov. 30 in Sullivan Wisc.

Fred R. Klaus, 76, vice-president and general manager of the United Manufacturing Co., Bedford, O., which he founded, and a leading automotive inventor and production expert (his many developments included a truck wheel rim), and founder of the Wheel & Rim Co., Warren, O., died Nov. 22.

William H. Brearley, 75, former secretary and member of the board, Autocar Co., died in Wilmington, Del., on Dec. 1.

Worthington Pump and Machinery Corp.—The appointment of **A. M. Shaw** as asst. manager, Pump and Compressor Merchandising Div., has been announced.

The Carpenter Steel Co.—The appointment of **O. V. Greene** as New England sales manager, with headquarters in Hartford, has been announced. **He** succeeds **W. F. Rossiter,** who has been made asst. to the vice-president. **J. W. Thompson,** formerly manager of alloy steel sales, has been named manager of sales development, succeeding **Mr.** Greene.

General Electric Co.—Three appointments were announced in the Aviation Divisions as follows: **R. A. Averitt** and **H. T. Hokanson** were named manager and asst. manager, respectively, of the newly-formed application engineering division and **E. S. Gallagher** was appointed manager of sales of the new sales div. **D. S. MacDonald has been** appointed asst. to the manager of the Gear Motor Div.

Black & Decker Mfg. Co. — **M. R. Sacra** has been elected a director to replace **Harry O. Norris,** who resigned some time ago.

Firestone Tire & Rubber Co. — Appointment of **Dr. John N. Street** to the position of director of chemical laboratories, has been made.

Goodyear Tire & Rubber Co.—**Victor Holt, Jr.,** has been advanced to the vice-presidency of the Goodyear Sales Company, succeeding **J. E. Mayl,** vice-president, who becomes sales coordinator.

Menasco Mfg. Co.—**J. I. Hamilton** has been named general sales manager. He replaces **B. C. McNeill,** who has resigned.

Ethyl Corp.—**Dan M. Guy** has been appointed assistant director of technical service in the research laboratories at Detroit.

Federated Metals Div., American Smelting & Refining Co.—**Sherman M. Goble** has been appointed manager of the new Plating and Electrochemical Dept.

Reynolds Metals Co.—The appointment of **Stuart Smith** as product manager, sheet & plate sales, has been announced.

The American Coach & Body Co. — **Fred C. Hall** has been appointed director of sales, succeeding **Clarence G. Wood.**

Electro Chemical Supply & Engineering Co.—The appointment of **Fred G. Baker** as director of engineering and design, has been announced.

(*Turn to page* 58, *please*)

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D-143 Injection Molding

Tennessee Eastman Corp.—A new enlarged edition of the book, Tenite Injection Molding, contains detailed data on such pertinent matters as choice of material, proper product design, injection-molding machines, mold design and construction, and various finishing operations. Included are diagrammatic drawings of typical injection-mold designs and a helpful section which outlines common molding difficulties and their suggested solutions.

D-144 Machine Tool Accessories

The Cincinnati Gilbert Machine Tool Co.—A new 6-page bulletin, No. 749, covers illustrations, descriptions and specifications on Precision Dial and End Measuring Instruments, 2-Way Feed Facing Heads, Full and Semi-Universal Milling Attachments, etc.

D-145 Lubricants

Keystone Lubricating Co.—A new 30-page edition of the Keystone Application Guide presents the line of Keystone Specialized Lubricants for industrial and automotive machinery. Included in the guide are tested recommendations for lubricating all types of bearings under various operating conditions. Other information covers lubrication of power generation, transmission and materials handling equipment; also special recommendations covering lubrication of pump glands, valves and other equipment subjected to contact with acids, alkalies and moisture.

D-146 Tank Heating and Cooling

Kold-Hold Mfg. Co.—Tank heating and cooling is described and illustrated in a new 6-page bulletin. A direct comparison is made between Platecoil and pipe coil methods of heat exchange.

D-147 Metal Drawing

Esso Standard Oil Co.—Drawing Compounds for Metals is the title of a new booklet which contains detailed recommendations for selecting drawing compounds for use on various ferrous and non-ferrous metals in stamping, forming, wire drawing, tube drawing, tube bending and stretch forming, as well as in hot tube bending, extrusion and forging.

D-148 Carbide Dies

Carboloy Co., Inc.—Details of improved features in its standard round hole dies are given in Supplement D-3 to its general die catalog, D-126. The supplement lists specifications and prices for dies R-1 through R-19 for drawing wire, bar and tubing.

D-149 Bench Shaper

South Bend Lathe Works—Bulletin No. 500 illustrates and describes the company's new 7 inch Bench Shaper. The 4-page bulletin is in two colors. In addition to a complete description of the shaper, a 3-drawer steel stand, motors and tools are shown. Prices on the various items are listed.

D-150 Clutch and Brake Units

Warner Electric Brake Mfg. Co.—Bulletin No. 701, a new combination engineering catalog and reference book, includes detailed drawings and photographs of the Warner ICB clutch and brake units for industrial machinery and electric motor application. The bulletin contains the necessary information for computing clutch and brake torques. Included are charts for proper selection as to size of Warner ICB units.

D-151 Spring Tester

Baldwin Locomotive Works—A new 4-page bulletin illustrates and describes the Baldwin-Hunter spring tester and its applications. The bulletin explains the value of this precision instrument.

(*Turn to page 70, please*)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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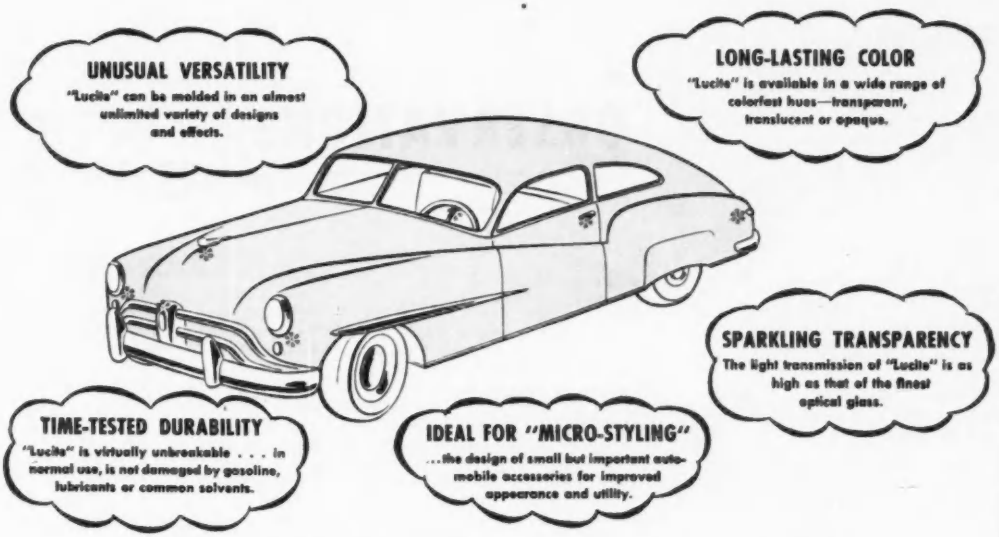
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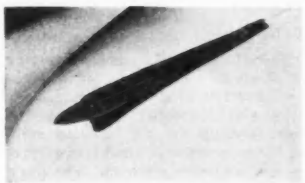

A smart-looking hood ornament of durable "Lucite" adds distinction . . . keeps its brilliant color and handsome design through years of weathering and hard outdoor service. (Molded by Cruver Mfg. Co., Chicago; Waterbury Industries, Waterbury, Conn.)

Reflector and tail lamp lens are sparkling examples of the many auto parts molded of versatile "Lucite." They are weather-resistant and transmit an extremely high percentage of light. (Reflector molded by Stimsonite Plastics, Chicago. Tail lamp lens molded by Electric Auto-Lite Co., Bay City, Mich.)

A recent product of Du Pont research, "Lucite" HM-140 is attracting wide attention among molders and designers of automotive parts.

HM-140 is a heat-resistant "Lucite" composition with excellent molding properties. In many cases this means shorter molding cycles and less shrinkage of the molded piece. Higher temperatures can be used in molding thin or intricate sections to obtain a great degree of fluidity without chemical breakdown. More accurate molding is possible with a corresponding reduction in rejects. And the color of HM-140 has been improved to provide greater stability at higher temperatures and on exposure to weathering.

The luxurious beauty of "Lucite" HM-140, its wide range of long-lasting colors, and its rugged durability make it ideal for styling automobile accessories that will impress exacting customers. And these improved features mean that hood ornaments, horn buttons, medallions, and other auto parts are now even more practical and beautiful when made of "Lucite."

WRITE FOR FURTHER INFORMATION on "Lucite" HM-140 and other Du Pont plastics. If you wish, Du Pont representatives will be glad to assist you in adapting Du Pont plastics to your requirements. Write to Polychemicals Department, E. I. du Pont de Nemours & Co. (Inc.), at the most convenient address: General Motors Bldg., Detroit, Mich.; 350 Fifth Ave., New York 1, N. Y.; 7 S. Dearborn St., Chicago 3, Ill.

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Plastics
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PERSONALS—

(*Continued from page 54*)

Tinnerman Products, Inc.—**Eric Dudley** has been named manager of aviation development and manager of the Pacific Coast district.

Hanson-Van Winkle-Munning Co.—The following changes have been announced in company personnel—**P. R. Lyons** has been made manager of electrical sales, with headquarters in Matawan. **Martvig J. Moll** has been appointed manager of conveyor sales, while **Irving A. Gemmel** has been made asst. manager of conveyor sales.

Tungsten Alloy Mfg. Co.—**Harry C. Gross** has been appointed chief chemist and metallurgist.

Gulf Oil Corp.—**Jos. E. Pogue**, vice-president Chase Natl. Bank, was elected a member of the company's board of directors.

Selas Corp. of America — **Hilding Carlson** has been appointed advertising and sales promotion manager.

CALENDAR

Conventions and Meetings

Nat'l Motor Boat Show, New York City ..... Jan. 6-14
Brussels Auto Show, Brussels, Belgium ..... Jan. 14
SAE Annual Mtg., Detroit ..... Jan. 9-13
Nat'l Soc. Plastic Engineers' Conference, Cleveland ..... Jan. 11-13
Plant Maintenance Show, Cleveland ..... Jan. 16-19
Nat'l Auto. Dealers Assoc., Atlantic City ..... Feb. 5-8
Nat'l Auto. Access. Mfrs. Assoc. Annual Expos., New York City. Feb. 6-10
Pacific Automotive Show, San Francisco ..... Feb. 16-19
Chicago Auto Show, Chicago ..... Feb. 18-26
ASTM Spring Mtg., Pittsburgh ..... Feb. 27-Mar. 3
Amer. Road Builder's Assoc., Cincinnati ..... March 6-9
SAE Passenger Car, Body & Production Mtg., Detroit ..... Mar. 14-16
Geneva Motor Show, Geneva, Switzerland ..... Mar. 16-26
Southwest Automotive Show, San Antonio, Texas ..... Mar. 23-26
Nat'l Production Expos., Chicago .. Apr. 4-8
Midwest Power Conference, Chicago ..... Apr. 5-7
Amer. Soc. Tool Engineers Industrial Expos., Phila. ..... Apr. 10-14
Amer. Society Lubrication Engineers Convention, Detroit ..... Apr. 10-11-12
Society of Motor Mfrs. & Traders British Auto. & Motorcycle Show, New York City ..... Apr. 15-23
SAE Aeronautic & Aircraft Eng. Display, New York City ..... Apr. 17-19
Metal Powder Assoc. Annual Metal Powder Show, Detroit ..... Apr. 25-26
3rd Highway Transportation Congress, Washington ..... Apr. 26-27
International Motor Show, Turin, Italy ..... May 4-14
Mid West Automotive Show, Chicago ..... May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis. May 18-19
Amer. Electroplaters' Soc. Convention, Boston ..... June 12-16
A.S.T.M. Annual Mtg., Atlantic City ..... June 26-30
International Trade Fair, Chicago. Aug. 7-19

OBSERVATIONS

By JOSEPH GESCHELIN

Cadet Visor

At the last meeting of the body engineers group one of the industrial designers suggested that maybe it's time to revive the by-gone cadet visor as a part of the body. Many people have installed outside visors as a matter of real desire; many more others had to pay for one because the dealer had it in stock. Perhaps it is time to consider an integral visor. Certainly it can be made better looking than the ones that are tacked on.

Narrow V-Belt

We heard about the narrow V-belt shortly after the war but it is only recently that many passenger car engines have appeared with this type of belt. We observe a definite trend not only on passenger car engines but on some light truck engines as well to double belt drives for accessories. The narrow belt appears to have the advantage of taking little space, reducing the size and weight of pulleys, and most important of all—complete absence of slippage and squeak.

Pressure Upped

While little if any has been said about it, the postwar low pressure tires have caused considerable trouble on the road. The greatly increased footprint has reduced unit loading materially, thereby reducing ability to cut through the film immediately after a highway becomes wet following a dry spell. Brakes have locked and cars have gone out of control. It will be noticeable as 1950 car announcements are made that tire pressures are going up at least two lb. On some makes the recommended pressure for front tires will be upped to 26 lb.

Compression Dilemma

There is noticeable conservatism in many quarters as to the trend to real high compression engines. Despite the emphasis on high compression, it must be remembered that the term high compression today implies radical increase and not ratios incident to available fuels. Some highly placed individuals believe that the increase in octane ratings of fuels will be gradual—in small increments—and that it will be a matter of some years before fuels will surpass engine requirements. In short we fail to note a stampede to radically new engines designed with ability to operate at compression ratios in the region above eight to one.

Replacement Program

Although automotive manufacturing plants the country over have shown the most activity in the acquisition of new equipment, the industry still carries a considerable volume of machine tools ten years old and older. Granting that age is not a criterion of the usefulness of a machine, the fact remains that many of the older machines have outlived their usefulness from the standpoint of the advances made in speed and quality and productivity since the end of the war. How much of this lag is due to obsolete depreciation policies? How much can be attributed to the serious lack of replacement funds in many cases? These are important problems for progressive management to consider today.

Modern Steering

Although hydraulic power steering still is not as widely used as it might be, we are told that Vickers has made considerable headway in supplying power steering for off-highway vehicles, large industrial trucks and tractors, and similar equipment. The Saginaw recirculating ball type gear is spreading into more heavy duty GMC truck models and has been adopted as standard equipment by still another GM passenger car division.

Multiple Hobbing

The use of multi-thread hobs as a means of greatly increasing productivity is paying off in many plants. Barber-Colman, supplier of "Multithread" hobs, reports one installation where a double-thread hob has halved hobbing time with tool life of the order of 200 gears per sharpening. Yet quality is maintained at an extraordinary level. Involute is held within 0.0008 in.; spacing within 0.003 in. tooth-in-tooth and 0.0008 in. total index.

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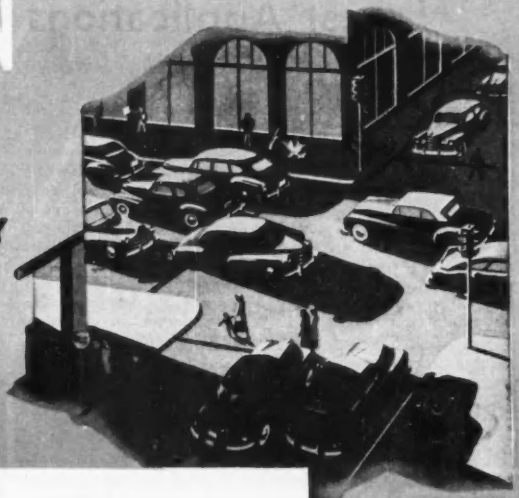

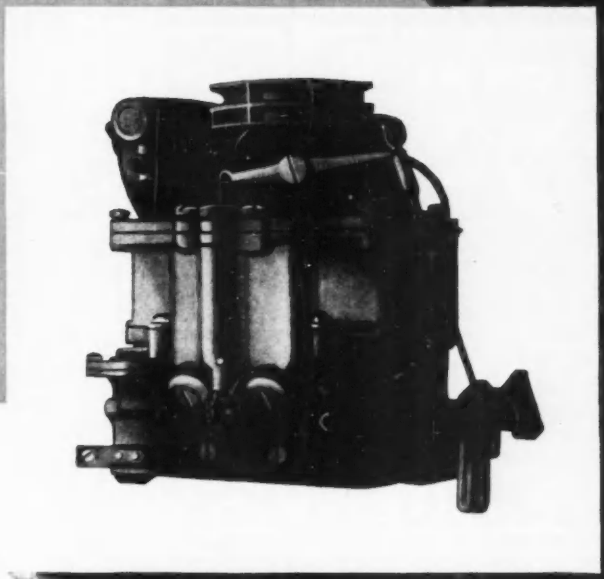

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Bendix
AVIATION CORPORATION

Latest Applications of Heliarc Welding

(*Continued from page* 40)

Direct current is the preferred source of power and most 200-amp motor-generator sets will be satisfactory, providing they employ sensitive adjustment of current.

Argon gas has been found to be the most suitable for these applications because it is more economical to use and permits a greater degree of manual arc control. Gas is generally piped to use points from a manifold.

In the interest of economy, it has been found essential to automatically control the flow of argon gas. A solenoid valve allows the continuous flow of a metered amount of argon. Upon extinguishing the arc, the control allows the continued flow of a sufficient amount of gas to cool the tungsten electrode.

A gas regulator is necessary to reduce the cylinder pressure to a working pressure of 25 lb per sq in. and a flow-meter is also required to control the volume of gas used.

Control of Stampings

The importance of joint fit-up must not be overlooked, since it affects not only the quality of the weld but also influences the speed of welding, finishing, and final cost. As would be assumed, the best condition from all standpoints is a joint in which the sheet edges are in metal-to-metal contact. No serious handicaps are suffered, however, if the sheet edges are not separated by more than the thickness of the material being welded. It is possible, if necessary, to weld a joint where the sheet edges are separated by ⅛ in. on 0.050-in. stock. However, such extreme spacing makes welding difficult and increases the total cost of the finished product.

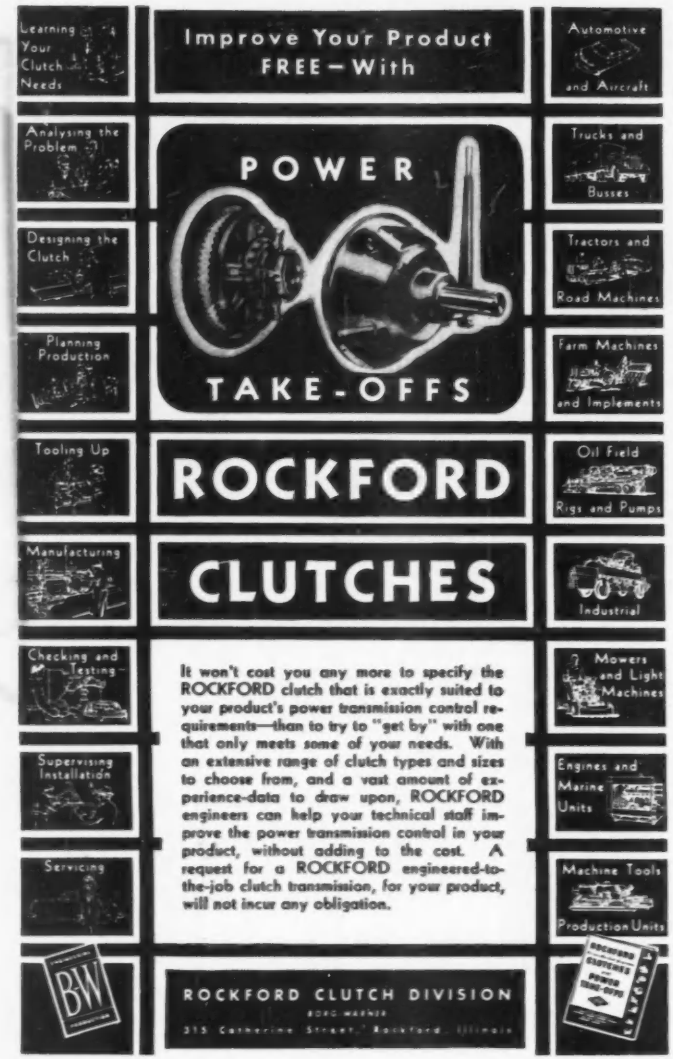
While the analysis and quality of the steel are important, it is only necessary that these qualities satisfy normal specifications. Off-analysis steel, high in sulphur, phosphorus, or other objectionable elements, may cause welding difficulties. Extreme variations in material thickness, abnormal spring-back and abnormal hardness will cause welding difficulties because of their effect on holding required tolerances when clamped in the fixture.

Consistency in stamping contours is essential, since variations will affect joint fit-up and proper holding of the parts in the fixture. Heliarc welding can be done in all positions, but, as in other welding processes, the best and fastest work can be done in the down-hand position. Therefore, on contour work, the fixture should position the work so that all welding will be done as close to down-hand as possible. A die trim should be the final operation on stampings to be subsequently welded. If a die trim is not used, difficulties with joint fit-up can be expected, which will be more costly than the die trim.

The Heliarc Weld

Most of the welding on automobile work is done without the addition of filler metal in the interest of reducing cost.

Frequently, however, it is necessary to add filler metals because of poor joint fit-up and poor holding properties in the fixture. Addition of filler metal makes it possible to salvage parts which would otherwise be scrapped. In many cases, poor quality steel can be salvaged, if necessary, by the addition of filler metal. It is difficult to weld steel which has not been fully "killed" with the process unless filler metal is added. The amount of rod required to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Analysing the Problem
POWER
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Designing the Clutch
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produce porous-free welds is very slight, but a small quantity must be added at regular intervals or porosity will result. It should be pointed out here that, in general, it is not possible to make high quality welds with the process in hot-rolled sheet either with or without filler metal.

The function of filler metal in eliminating porosity is that of cleaning the weld by injecting a "killing" action on the weld puddle. We have found that a chrome-manganese-silicon rod works very nicely for this purpose. Such filler rods as Norway iron, and low carbon mild steel are not normally suitable. In general, a torch angle of approximately 15 deg to the work is used. This permits good visibility of the joint, electrode, and puddle.

The length of electrode extension beyond the end of the gas cup varies with the torch angle employed. Good practice, however, dictates that the electrode extension should not be greater than ½ in., preferably ¼ to ⅜ in.

For the welding of automobile sheet in thicknesses under 0.050 in., the recommended gas flow is from four to five liters of argon per min. The necessity for higher gas flows indicates faulty equipment, poorly designed equipment, improper gas cup size, improper fixture design, or interference from drafts or artificial air currents.

On the welding of material thicknesses from 0.037 in. to 0.050 in., the current employed should fall in the range from 110 amp to 160 amp dc straight polarity. Again, it is difficult to definitely fix the current for a given material thickness because contours and operator's proficiency will be determining factors. Direct current straight polarity has proved far superior on this work.

It is possible to realize welding speeds of 16 to 40 in. per min. when Heliarc hand welding is employed. High speeds, of course, can only be obtained where complex contours are not involved and where fit-up and hold-down conditions are good.

Welding Costs

The cost of Heliarc welding will generally be greater than for other welding processes if no consideration is given to the other savings realized as a result of its use.

Production costs per lineal in. for welding and finishing of 0.037-in. stock used for fenders and bodies are shown in the following two tables.

Welding

Argon gas	$0.00122
Tungsten electrode	0.00004
Power	0.00003
Labor	0.00684
Approximate total cost	$0.00814

Finishing

Sanding disks	$0.0022
Labor	0.0118
Approximate total cost	$0.0140

It must be mentioned that this cost for finishing covers not only the weld area but all of the surrounding area requiring finishing. The figures given for welding and finishing are empirical averages which will not necessarily apply to all contours, and all production applications.

The process has been applied to the welding of bumper guards and bumper brackets with material thicknesses in the range of 0.100 in. Welding costs per lineal in. are approximately as follows:

Argon gas	$0.00172
Tungsten electrode	0.00005
Power	0.00008
Labor	0.00232
Total cost	$0.00417

It can be seen from the cost figures presented that costs are unpredictable. It would be expected that the heavier material welding costs would be greater. Normally, heavier material costs are higher, but conditions vary from plant to plant with regard to weld requirements, labor costs, size of parts, handling required, etc. This example should indicate the wisdom of investigating each possible application on its own merits.

The preceding article is an abstract of a paper presented at the recent National Convention of the American Welding Society in Cleveland.

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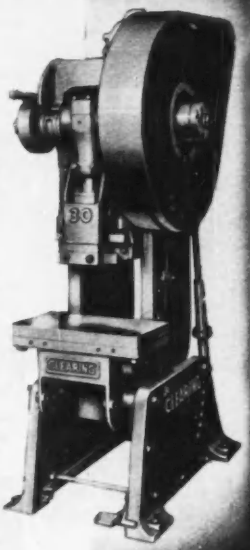

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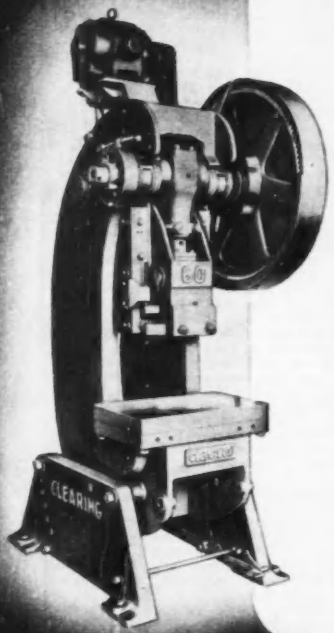

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Reflecting the end of the steel strike and the resumption of bituminous coal-mining, general business activity during the week ended Nov. 19 registered a marked recovery. Department store sales, electric power production, railway freight loadings, crude oil output, and bituminous coal production were higher than in the preceding week, while construction declined. The *New York Times* index of activity for the week ended Nov. 19 stands at 142.7, as compared with 120.0 in the preceding week and 156.8 a year ago.

Sales of department stores during the week ended Nov. 19, as reported by the Federal Reserve Board, equaled 342 per cent of the 1935-39 average, as compared with 318 in the week before. Sales were eight per cent below the corresponding distribution a year ago, as against a preceding decline of eight per cent. The total in 1949 so far reported is six per cent less than the comparable sum in 1948.

Electric power production increased more than seasonally during the week ended Nov. 19. The output was 0.3 per cent above the corresponding amount in 1948, as compared with a decline of 2.4 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 758,972 cars, 19.4 per cent more than the figure for the week before, but 11.6 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Nov. 19 averaged 5,211,050 barrels daily, 25,900 more than in the preceding week, but 496,900 under the comparable output a year ago.

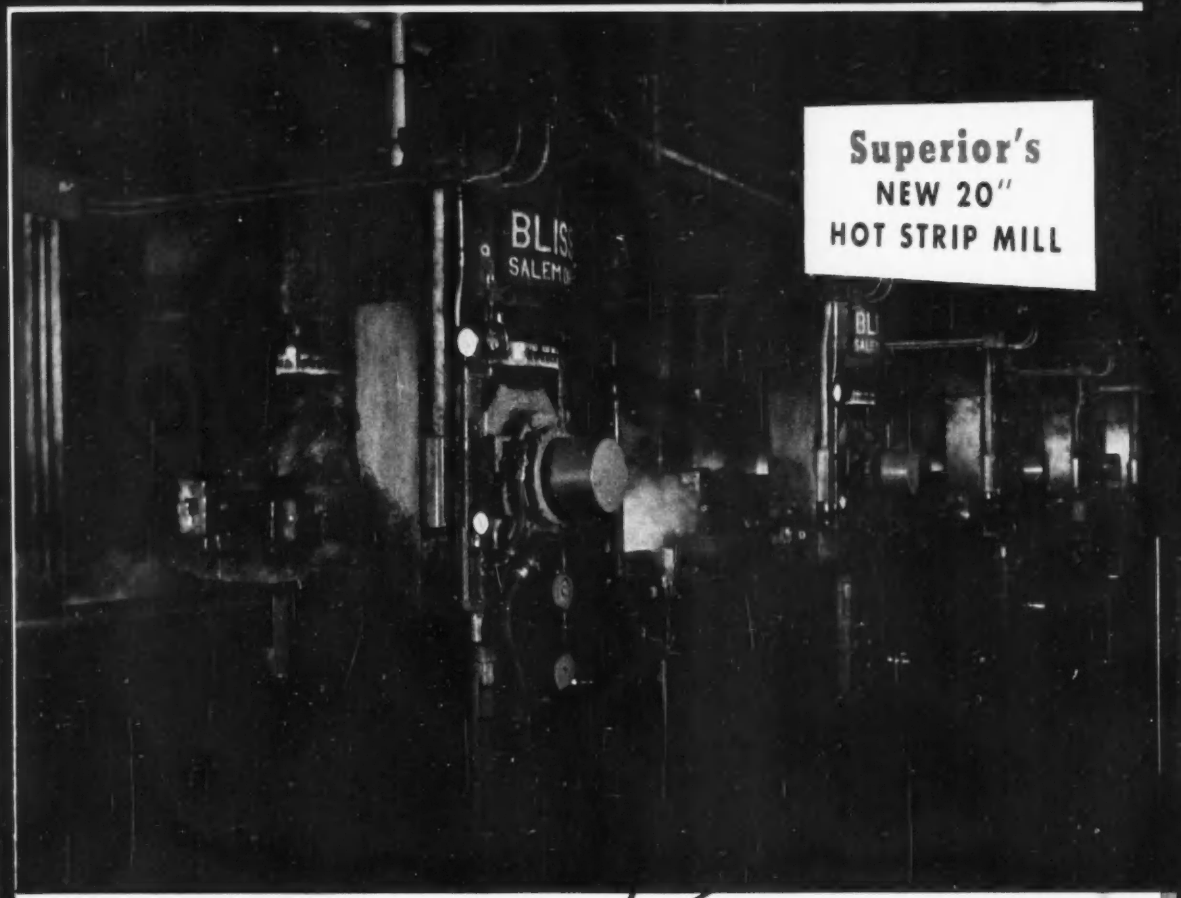
Production of bituminous coal and lignite during the same week is estimated at 14 million net tons, 6.9 million more than the output in the week before and 1,532,000 above the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Nov. 24, according to *Engineering News-Record*, was $90,344,000, or 58 per cent less than the preceding weekly figure and 12 per cent below the comparable sum in 1948. The total recorded for 47 weeks of this year was 17 per cent more than the corresponding amount in 1948. Private construction for the period was nine per cent above that of a year ago, and public construction increased by 18 per cent.

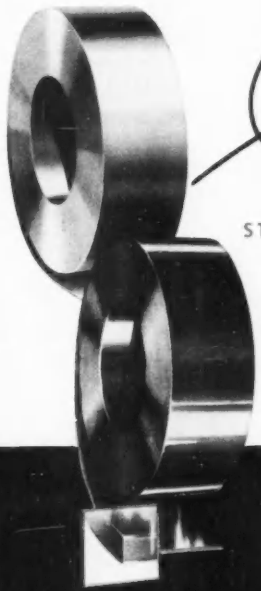
The wholesale price index of the Bureau of Labor Statistics during the week ended Nov. 22, at 151.5 per cent of the 1926 average, was 0.1 per cent more than in the preceding week, but 7.7 per cent below the corresponding figure in 1948. Advances were registered in all major commodity groups, with the exception of foods, metals and metal products, and building materials, which declined.

Member bank reserve balances decreased $445 million during the week ended Nov. 23. Underlying changes thus reflected include a decline of $260 million in Reserve bank credit and increases of $111 million in money in circulation, $83 million in non-member deposits and other Federal Reserve accounts, and $2 million in Treasury deposits with Federal Reserve banks, accompanied by an increase of $4 million in Treasury currency.

Total loans and investments of reporting member banks declined $114 million during the week ended Nov. 16.



OVER 50 YEARS OF *Specialization* IN STRIP STEELS



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LONG
CLUTCHES • RADIATORS • OIL COOLERS

Off-Street Parking Facilities

(*Continued from page 25*)

point up the source of the headaches which this long-term design trend provides for specialists in the development of off-street parking facilities.

Statistically speaking, even though the U. S. standard width for two lane roads or highways is now a minimum of 24 ft, the bulk of our road mileage in the U. S. consists of about 3,009,145 miles of two lane rural roads that run from 18-20-22 ft in width with comparatively narrow shoulders. Today, when two cars each 6½ ft wide pass on these crowned roads what happens to the desirable minimum lateral clearance of three ft gives highway engineers the jitters. Certainly this consideration will bear ever more heavily on future drawing board measurements for the new and different cars yet to come. It is a matter of common sense that the over-all car dimensions must eventually knuckle down to the average roadbed and the safety factors involved.

But this is not so with the design of these cars. And it is the design trend that poses the most serious problems in developing off-street parking facilities. Using our same statistics, let us examine that statement.

While over-all width has increased about one ft over a period of years, the front seat has expanded from a two to a "three seater." As we all know, this has been accomplished by moving the doors out where the edges of the running boards used to be, by the increase in over-all width, and by a slight camber to the interior sides. It's good. It's comfortable. It's a problem.

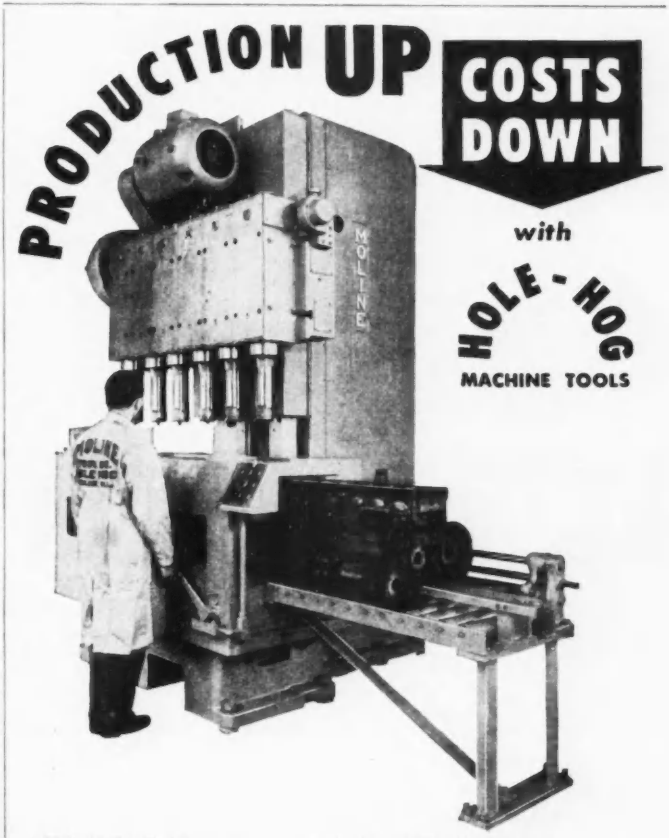
Only one ft wider in dimension . . . two cars—two ft extra, three cars—three ft extra, and so on . . . that is what one might expect to be the effect on the space needed to park today's automobiles in a multi-floor garage. But it doesn't work out that way. Over the years, as the doors and hinges were moved out to enclose the running boards, considerably more floor space than that was lost because of the additional room needed between cars of this design to enable people to get the doors open and get in and out of their automobiles easily. As a matter of fact, in new multi-floor facilities we have found we must increase the width of each car stall by about 18½ per cent just to handle the newer designs.

For 30 years we have been planning and designing parking structures to fit the product then current, with reasonable allowance being made for future changes in design. So far, we know of no example where the trend in car design has rendered an erected, established garage either unprofitable or obsolete. The danger, however, is that if the design trend persists — it very possibly could happen.

In the last eight years the number of so-called "over-age" cars has grown rapidly—from an estimated five million cars 10 years or over in 1941 to 15 million today. When these cars find their way to the junk piles and are replaced by the newer designs, it may cause trouble for many of the existing parking facilities now serving the public. And if the trend toward wider cars goes on and on — until some day, perhaps, the front seat of the new automobiles is able to accommodate four people—it most certainly will make the operation of garages already built a hazardous business proposition at best, and could result in the conversion of many of these facilities to warehouses or other types of business properties.

That is the warning note which might profitably be borne constantly in mind by any and every person who influences the design of new cars.

It took the automobile industry 54 years to build its 100 millionth car. It has been estimated that it will only take 16 years to build the next 100 million. But it is my guess that regardless



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of production capacities, the second 100 million will also be built over the next 54 years unless adequate parking facilities are available in every city and town in America.

Design-wise, yesterday's and today's garages can handle tomorrow's cars. It is certainly of the greatest importance to the automobile industry that they do nothing to their cars the day after tomorrow to upset that picture. The best way I know of to preserve the usefulness of existing facilities, and to stimulate the planning of new multi-floor garages, is to halt the trend toward wider and still wider cars, and perhaps begin to "take off the excess fat."

Scheduling Car Production

(*Continued from page* 34)

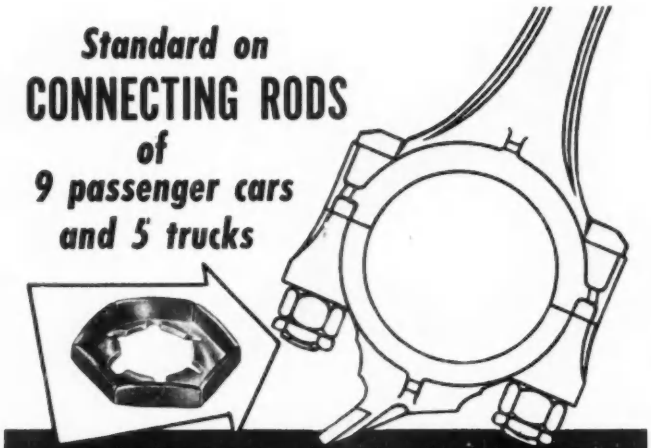
Examination of tele-typewriter station locations will give a quick picture of the basic control areas responsible for maintaining a smooth flow of materials to the final assembly line, in proper timing and sequence.

The matter of sequence is most important, since it is the key to the matching of the right body and paint with sheet metal and wheels and tires. This is done by identifying each car to be built with an "item" number, all item numbers following in numerical sequence. Consequently, at any given time, as for example when starting a shift, the first chassis on the line carries a specific item number. In turn, every major component such as the body, front end sheet metal assembly, wheel and tire sets, etc., at the head of its line has the same item number and, consequently, meets the specifications of the car to be built.

In the final analysis, one of the biggest responsibilities of the planning department is to control the flow of materials and parts according to basic plans laid down by the management, reduced to daily production. All total quantities juggled by this department are cumulative. Rejects are deducted when discarded. Then similar quantities are added to the total when replaced. Banks are constantly juggled to control inventory and prevent overstocking.

Pipe line control—control of the continuous flow of parts and materials to the plant—is another vital function. Consider just one example. In the event of a strike or shut-down for any other reason, steps must be taken to reduce pipe line flow or shut it down where feasible to prevent an accumulation of materials. A stoppage of a week's duration could mean a piling up of freight car, trailer, and truck loads of materials; thus creating a vast material handling problem.

Standard on CONNECTING RODS of 9 passenger cars and 5 trucks



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Millions of all types of PALNUTS
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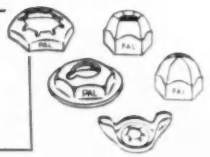

1950 Oldsmobiles

(*Continued from page* 31)

panel having considerably more area. Push-button type door locks now are standard on all bodies. Trunk room has been increased approximately 10 per cent on the Series 98 bodies for 1950.

Taking the new four-door sedan for the 98 as an example, the roof line has been lowered by 1½ in. while bumper-to-bumper length has been decreased by 5¼ in. Maximum width of this body is increased 1¼ in. over last year. At the same time front seat width is increased slightly while the width of the rear seat has been increased from 52 in. to 65 in.

In connection with interior styling, it is worthy of note that deluxe models of both 88 and 98 cars will feature a new nylon weave fabric.

The heating and ventilating system has been simplified considerably by some changes which make it possible to eliminate the auxiliary blower previously required for operating the defroster.

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Multiple-checked for Accuracy

THIS saves assembly time during bearing installation . . . hence, a money-saving feature. Every Johnson Sleeve Bearing is carefully multiple-checked for wall thickness and all dimensions before shipment from the Johnson Bronze plant. This assurance of uniformity and accuracy makes Johnson Bearings preferred parts in the automotive industry.

***You** will find Johnson Engineers willing to help you decide which type bearing is best suited and to design it for the application. As we manufacture all types of sleeve bearings, we base all of our recommendations on facts, free from prejudice.*

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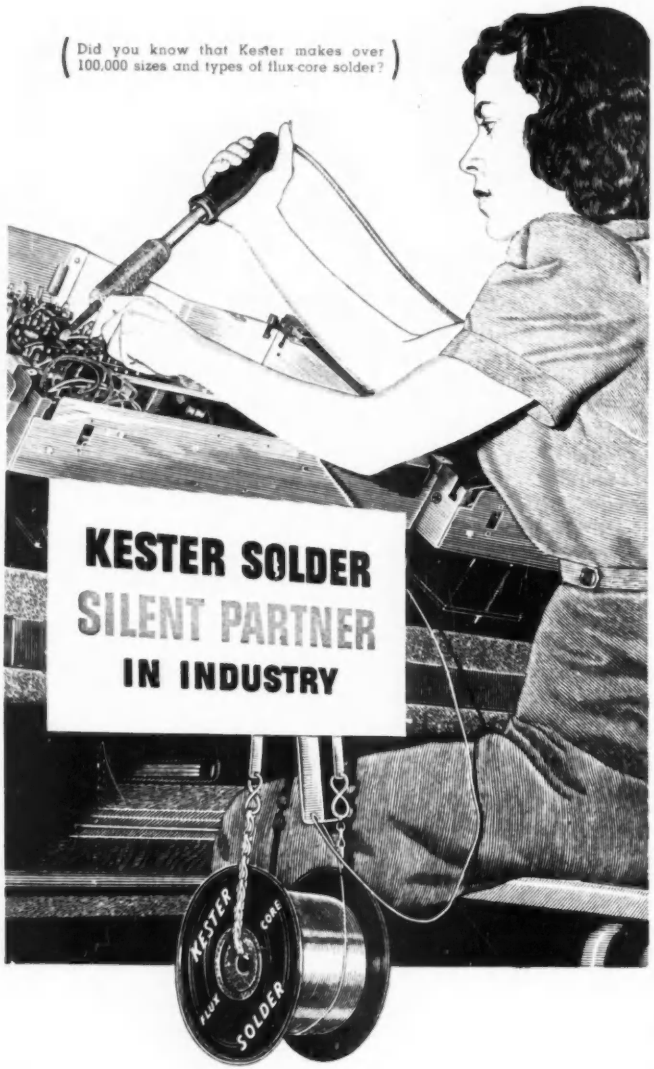

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FREE—Technical Solder Manual Available on Request

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1899 50th Anniversary 1949

KESTER SOLDER

PUBLICATIONS

(*Continued from page 56*)

shows its design features, set-up and operation for production testing and illustrates its use in various ways. Specifications are also given.

D-152 Caravan Axles

United Manufacturing Co.—A new multi-colored 12-page illustrated catalog, No. 101, describes the complete line of Caravan Axle assemblies as well as component parts and accessories. Specifications are given for both two and four-wheel assemblies. Special sections are devoted to complete descriptions of mounting brackets, and brakes, spindles and hitching devices.

D-153 Flame Cutting Equipment

Joseph T. Ryerson & Son, Inc.—A new bulletin illustrates intricate and unusual steel shapes supplies by the company, cut to order with the new Electric Eye flame cutting equipment. Typical of some of the irregular shapes furnished are sprockets, grinding wheels, boom bars, crankshafts, machine and equipment frames, etc.

D-154 Electrical Fittings

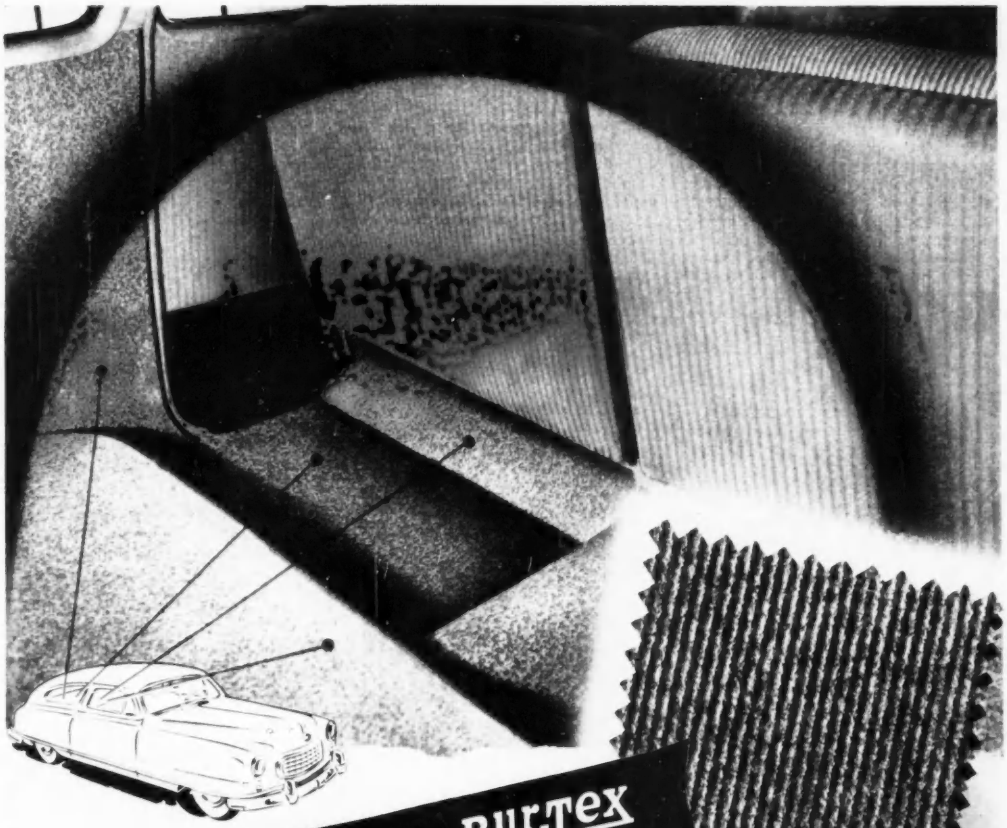
Buchanan Electrical Products Corp. —Illustrations, dimensional data and application instructions are included in a new 12-page catalog covering solderless connectors, cable and conduit fittings and wiring devices.

D-156 Cummins Diesels

Cummins Engine Co., Inc.—Two new bulletins containing complete specifications of all automotive and industrial models of HR-600 and HRS-600 Cummins Diesels are available. Each bulletin includes general specifications, a list of standard equipment for each model, together with optional equipment. The bulletins are illustrated with installation drawings and photographs of the various models, plus drawings illustrating torque, horsepower and fuel consumption curves.

New Plier Patterns

With the addition of 15 new plier patterns, J. H. Williams & Co., Buffalo, N. Y., have rounded out their plier line to cover the most popular sizes and styles used in industrial and automotive work. Additional styles include end cutting nippers, long and short chain nose, long and bent needle-nose, duck bills, round nose, gas and burner, fence and staple puller and battery pliers. All jaw faces are brightly polished.



Nash chooses Bur-Tex

The large, functional, open area back of the front seat of the 1950 Nash Business Coupe presented an unusual problem to the designers. The lining of this area would be exposed to hard wear and subject to the abuse of heavy sample cases. So they chose . . .

Bur-Tex Plastic-Coated FELT CARPETING, #180-B

And that's because it is INEXPENSIVE, ATTRACTIVE, TOUGH, EASY to CLEAN and EASY to INSTALL. The material used is factory fabricated by Burlington Mills ready for quick, easy installation.

Note the stylish rib effect of real carpeting...

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Crankcase Ventilation Analyzed

By J. B. Lawson and J. Bartels,
Polytechnic Institute of Brooklyn

There are two items in the field of automotive engine development which are excellent when taken separately, but which are bad actors when performing as a duet. These two developments are forced crankcase ventilation secured by electrically-driven blowers; and elevated engine operating temperatures which result from the use of pressurized cooling.

There is a readily accepted premise that crankcase ventilation is desirable, for it holds down crankcase dilution, and it helps prevent the formation of cold sludge. Also, one can not deny the logic of the manufacturers who are going over to the use of pressure caps atop the radiators which permit cooling water temperatures of 250 F.

Laboratory tests were conducted on a single cylinder engine in which the lube oil temperature in the crankcase was maintained at 250 F. The engine was put through a series of 25-hour runs under conditions of: No ventilation of crankcase, with case sealed; natural ventilation, with two openings in crankcase; forced crankcase ventilation, using a motor-operated blower.

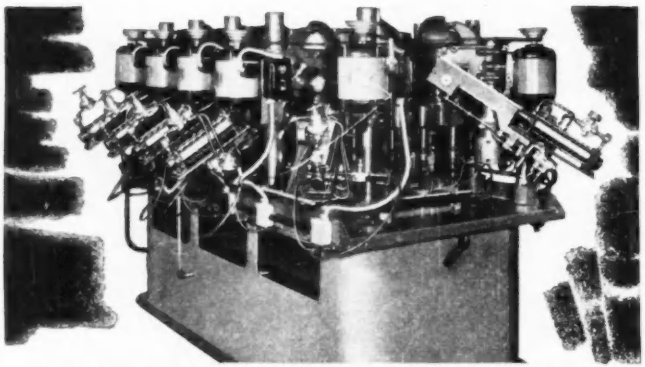
Then the oil temperature was reduced to 150 F, and a new series of runs was conducted with the various crankcase ventilating conditions.

The results of each run were evaluated on the basis of the varnish formed on the piston and rings when measured by an arbitrary varnish scale, the wear of engine parts determined by changes in weight, and the changes in physical properties of the lube oil.

The ventilating arrangements had little effect at the constant 150 F temperature. However, the story was very different at the 250 F oil temperature.

At the elevated oil temperature of 250 F, good performance was secured with the sealed crankcase, slightly poorer performance with natural ventilation, and a near-casualty resulted run with forced crankcase ventilation arrangement. The results of the last run with forced crankcase ventilation at 250 F were confirmed by repeating the run after putting in a new piston and set of rings. Once more, wear increased, the rings became gummed up, lube oil consumption leaped upward (getting by a stuck ring), and varnish deposit was heaviest. Also, the rate of oxidation and break-down of the oil increased as determined by the neutralization number.

On the basis of the above results, the authors recommend the inclusion of a switch in the electric circuit of the forced crankcase ventilation blower motor to cut off the blower when the lube oil temperature reaches 200 F. Such an arrangement would provide the protection of positive crankcase ventilation for low temperature operation, and would still permit good operation in the economical temperature region of 250 F.



12 Spindles of Automatic Drilling Machine are NOPAK Operated

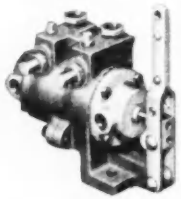
NOPAK Reciprotrol 4-Way Valves automatically control Speed-and-Length-of-Stroke of Reciprocating Cylinders.

12 NOPAK Reciprotrol Valves Actuate 12 NOPAK Cylinders

Twenty-four 5/8" holes are drilled every 15 seconds by this high production machine, specially built for the U. S. Government by Dorr Sales Co., Milwaukee, Wis. Feeding and retraction of the 12 drill press spindles is fully automatic once the master control valve (a NOPAK 3/8" 4-way operating valve) is opened.

The master valve trips twelve 3/8" NOPAK Reciprotrol Valves which actuate 12 NOPAK 3" x 10" Model "A" Cylinders. Each cylinder "feeds" one of the 12 large, double-spindle, drill-press heads, retracting the spindle after the hole is drilled. The 12 cylinders operate automatically at a pre-determined stroke speed, governed by the Reciprotrol Valves, and depending upon the size of hole and thickness of metal to be drilled.

Write for Special Bulletin on NOPAK Reciprotrol Valves.



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AIRBRIEFS

(*Continued from page 52*)

knowledge, to produce a turbojet-powered airliner that is cheaper to operate than a DC-3 or DC-6. We can even believe that, with the above two conditions, even a ramjet or rocket-powered aircraft could be operated at a high enough speed to bring its economy to a point competitive with the DC-3. Obviously, then, it is the decision that is made at the "top" that determines which way a particular phase of aircraft development goes. If Secretary of Defense Louis Johnson says: "Turboprops!", that word unleashes a flow of gold into their development that assures their eventual success. If Boeing president Allen says: "Turbojets!", then that is the form the next Boeing transport will take. While it can

(*Turn to page 88, please*)

Light pressure seals for stamped and rough-cast parts

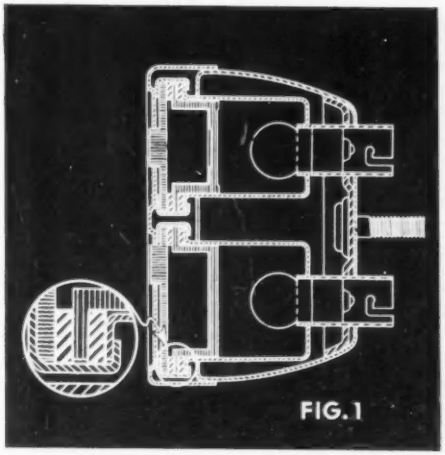
FIG. 1

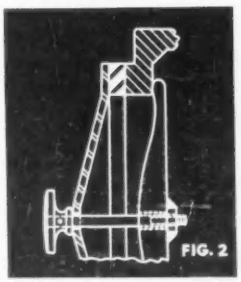
FIG. 2

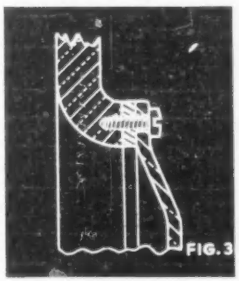
FIG. 3

Sealing stamped and rough-cast surfaces requires gasket materials with an unusual combination of properties. These materials must be soft enough to seal irregular surfaces without buckling light stampings. Yet they must be sufficiently firm to retain their kickback. And, of course, they must be impervious to the sealed medium.

These diverse requirements are met by Armstrong's Cork-and-Rubber Gasket Materials. Compressible cork particles dispersed throughout a matrix of synthetic rubber give cork-and-rubber its softness and lasting resilience without objectionable sideflow. Cork-and-rubber also has a resistance to fluid penetration that is comparable to straight synthetic rubbers.

In figure 1, for example, cork-and-rubber provides a weathertight seal on a stamped signal lamp housing. It conforms to surface irregularities in both the flanges and lens and cushions the lens against breakage. Resilient cork-and-rubber also reseals tightly when broken lenses and burned-out bulbs have been replaced.

Cork-and-rubber provides an effective seal for the stamped diesel hand hole cover in figure 2. Its softness permits economical light pressure assembly without buckling the cover. Yet despite frequent opening and closing of the cover, cork-and-rubber retains its sealing efficiency.

On waterproof electric motors, an unmachined cast flange and stamped cover plate are sealed with cork-and-rubber as shown in figure 3. Cork-and-rubber conforms to surface irregularities and is unaffected by exposure to oils and salt water.

Light pressure seals are but one kind of problem solved by Armstrong's Cork-and-Rubber. Chances are, its unique properties can help seal your problem jobs. We suggest that you contact your Armstrong representative today.

Send for this Gasket Handbook

You'll find useful application and specification data in the revised 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date information on straight synthetic rubber, cork-and-synthetic-rubber, and cork composition gasket and sealing materials.

This booklet includes ten technical discussions of the factors influencing modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries.

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A handy guide to ALLOY STEELS

HERE for ready reference are listed the various grades of U·S·S Carilloy constructional alloy steels available for use in automotive, truck and farm implement parts.

The grades shown for each application or part are not necessarily the only grades suited for a particular purpose, but are rather those grades most commonly used.

It is obvious that design, economy, machining facilities, availability of heat treating equipment and other factors will enter into your final selection of the alloy grade best suited for your particular purpose. To get optimum results from these steels, we suggest that you obtain expert advice both in selecting and applying them. This we are prepared to furnish.

Our staff of service metallurgists is always ready to study individual problems and to assist you with practical recommendations that you will find extremely helpful not only in determining what grade of U·S·S Carilloy will do the best job for you, but in showing how it can be handled most efficiently in your shop.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH AND CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST TO COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

	AUTOMOBILE, LIGHT TRUCK, TRACTOR						HEAVY TRUCK	DIESEL ENGINE
	Arms and Knuckles		Axles and Shafts		Universal Joints	Sway Eliminator Bars	Crank Shafts	Crank Shafts
Tensile Strength Range, psi.	125,000 to 165,000	150,000 to 200,000	150,000 to 200,000	175,000 to 225,000	125,000 to 175,000 (Core)	140,000 to 170,000	140,000 to 170,000	100,000 to 125,000
Mn	1340		1330	1340				
Ni Cr	3130, 3135, 3140		3140, 3145					
Mo	4047, 4053		4063, 4068			4068		
Cr Mo	4135, 4142,		4140, 4145, 4150			4140	4142	
Ni Cr Mo		4337, 4340		4340, 4345	4317, 4320		4340	
Ni Mo			4640		4617, 4620			
Cr	5132				5120	5145, 5150, 5160	5145	5046, 5145
Ni Cr Mo	8640, 8642, 8645		8640, 8650	8653	8650			
	8740, 8742		8740, 8750		8720			
		9840		9840, 9845				

	STEERING WORM AND SECTORS		OVERDRIVE CASES	PISTON PIN BUSHINGS	INTAKE VALVES	PUMP SHAFTS	COUNTERSHAFT AND OTHER PINS	
Tensile Strength Range, psi	115,000 to 160,000 (Core)	175,000 to 250,000	150,000 to 190,000 Core	115,000 to 160,000 (Core)	125,000 to 160,000	125,000 to 160,000 (Core)	125,000 to 160,000 (Core)	175,000 to 240,000
Ni Cr					3140			
Cr Mo					4140			4130, 4140
Ni Mo	4620					4620	4620	
			4820					
Mo							4027, 4032	
Cr	5120	5132, 5135		5120			5120	5135, 5140
Cr V				6120				
Ni Cr Mo	8620						8620	
	8720				8740			
Cr Mo Al						Nitriding Steel		

CARNEGIE-ILLINOIS STEEL CORPORATION

for automotive applications

	AUTOMOTIVE, LIGHT TRUCK, TRACTOR GEARS				HEAVY TRUCK, HEAVY TRACTOR, BUS GEARS	
Tensile Strength Range, psi	110,000 to 150,000	150,000 to 200,000	250,000 to 300,000		110,000 to 150,000	150,000 to 200,000
Mn	1320		1340			
Ni				2340, 2345	2317	
					2512	2515, 2517
Ni Cr						3310, 3316 SuperKore AA
Mo	4023, 4027, 4028, 4032					
Cr Mo			4140	4140, 4145		
Ni Cr Mo		4320 SuperKore C	4340	4340		4320 SuperKore C
Ni Mo	4620	4815 SuperKore B			4620	
						4820 SuperKore B
Cr	5120	5132	5135, 5140, 5145			
Ni Cr Mo	8615, 8620, 8622		8640	8640, 8645, 8650	8620	
	8720		8740	8740, 8745, 8750	8720	

CARNEGIE-ILLINOIS STEEL CORPORATION

	AUTOMOBILE AND LIGHT TRUCK SPRINGS		LARGE TRUCK AND BUS SPRINGS	TRACTOR SPRINGS	
	Leaf Springs	Coil Springs	Leaf Springs	Leaf Springs	Coil Springs
Mo	4063, 4068	4063, 4068			
Cr	5147, 5150, 5152, 5160	5160	5160		
Cr V	6150		6150	6150	6150
Ni Cr Mo			8655	8655, 8660	8660
Si Mn	9260	9260	9260	9260	9260
Si Mn Cr	9261		9261, 9262	9261, 9262	9261

CARNEGIE-ILLINOIS STEEL CORPORATION

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH — COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

9-1648

UNITED STATES STEEL

Automation Expedites Coil Spring Production

(*Continued from page 44*)

falling into a chute. Then the arbor moves back completing the cycle of the machine and the next bar is fed in from the furnace. Since the machine is automatic, all the operator does is to guide the previously shaped bar end between the roll and the arbor.

At the bottom of the short chute, the coil is positioned endwise by an automatic air ram and then is picked up, Fig. 5, by mechanical tongs called an "iron man" at the end of a swinging arm. This arm is rocked upward and, as the tongs open, deposits the coil in one of eight fixtures on the drum of a Gogan quenching machine, left in Fig. 5. There, the coil is cam locked and is clamped for length and against warpage by the fixture before the drum indexes. This moves the coil into an oil quench that is rapidly circulated and held at a temperature of 110-130 F by a cooling system.

The "iron man" is operated by air plungers in cylinders with valves controlled by time delay relays. Motion is precisely timed in synchronism with the coiler and with the quenching machine; both of which are automatic. This piece of handling equipment, designed and built especially for this job, required considerable development work but functions well.

There is, of course, a quenching machine for each coiling machine and an "iron man" to serve each such pair. After each coil is quenched, it continues through the oil until, at a station above oil level, the fixture opens and the coil rolls down a chute, Fig. 6, onto a transfer chain serving chutes from each quench tank. When this chain, moving across the lower ends of the chutes, collects four coils, the four are pushed off the chain by an air ram and enter one of the two tempering furnaces.

These draw furnaces are a gas fired recirculating type built by Induction Heating Corp., and each is six ft wide by 60 ft long and has a slat conveyor that advances the coils from end to end in 72 min. During this transit, coils attain a temperature of 810 F. The coils roll out onto another slat conveyor that carries them through a water spray for cooling to handling temperature.

At the end of this conveyor there is an air-operated swinging arm that sweeps the coils onto a short transfer belt conveyor. Here air-operated gates push coils into one of three Wheelabrators. These shot blast all of the coil spring's surfaces as the springs are advanced along a pair of rolls that keep them rotating.

Fingers projecting upward between the rolls and attached to a rubber belt keep the springs moving longitudinally along the rolls as blasting with No. 230 chilled shot proceeds. Blasting not only removes any scale adhering to the springs but also cleans them, and increases fatigue resistance. Ten springs pass through each Wheelabrator per minute and slide down chutes onto a wide belt conveyor.

Springs are first guided toward the center of this belt and then into three parallel channels that feed them into three compartments of a cradle, Fig. 7, that is rocked upward by an air plunger. Springs thereby are brought into position for engaging hooks arranged in sets of three and hanging from a continuously moving overhead monorail chain. Each hook picks up a spring after which the cradle rocks back to receive three more springs from the belt. The cradle's operation is automatic and it is an effective means for transfer from belt to chain.

On the chain, springs are first car-

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FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD!
Engineered by Borg & Beck
means . . . expertly designed and precision built
by clutch-making SPECIALISTS!
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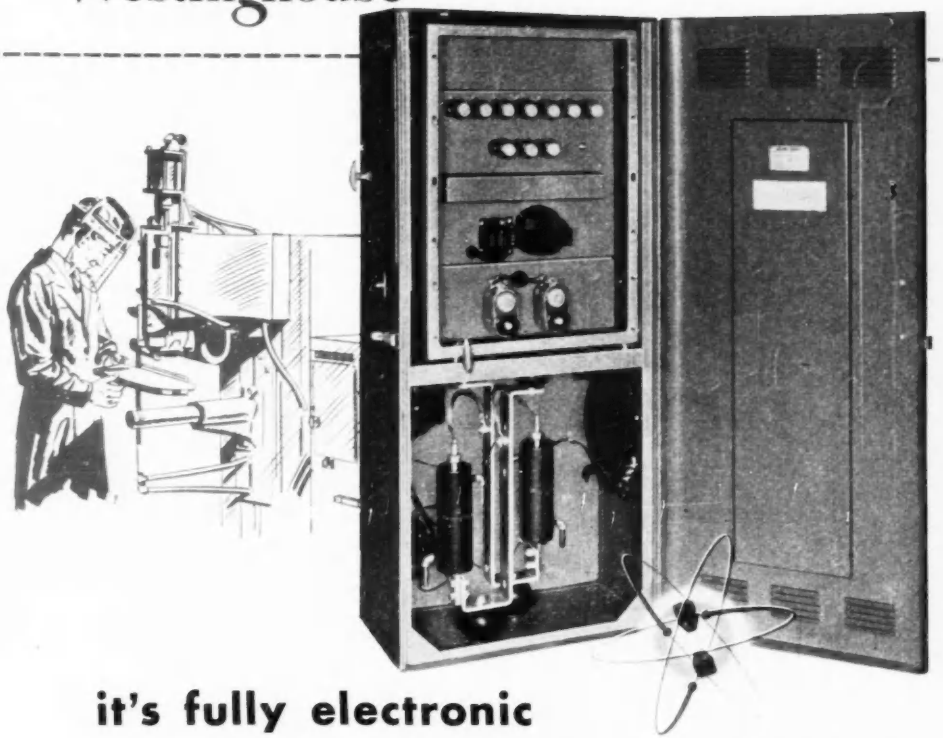
BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO 38, ILLINOIS

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



it's fully electronic

. . . to hold weld quality up . . . costs down!

The control of a resistance welding machine is a grueling job made easy by the new Westinghouse Control. For example, it calls for the making and breaking of high amperage circuits with machine gun frequency. Each weld depends on many timing functions, which must be achieved with repetitive accuracy.

In the new Westinghouse Resistance Welding Control this big job is handled by tireless electronic tubes. The result is a design in which virtually all moving parts have been eliminated. This gives you important advantages on the welding assembly line. Better assembly quality, for one thing, because complete electronic sequencing assures a degree of *precision unattainable with mechanical or only partially electronic controls.*

On spot-welded parts, for example, rhythmic timing produces welds that are strong and evenly spaced and the desired uniformity is easily attained since the operator doesn't have to fight the gun.

Consistently good weld quality means fewer rejects . . . more output, for less. Easing the operator's job also steps up weld production by permitting faster handling of the work.

Get the complete story on this new cost-saving control in booklet B-4309. Address Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21536

Westinghouse

RESISTANCE WELDING CONTROL

Automation

(*Continued from page 76*)

ried through a black enamel dip and then through a Dispatch gas fired oven of the recirculating type where the enamel is baked at 450 F for 45 min. After leaving the oven, the chain carries the enameled springs through a cooling water spray and, after a short space for water to evaporate, delivers the springs to a four-cylinder Link compressing and weighing machine. One spring drops into each cylinder and is compressed six times, the last three times being closed until adjacent coils make solid contact.

Then this automatic machine measures the pressure required to compress each spring to a 9½ in. length and accepts those that fall into two classifications—1875-1920 lb and 1874-1840 lb. Each class is marked automatically by small grinding wheels that apply at one end two grinder marks for springs in the high group or one mark for those in the low group. Any springs outside these groups are rejected and, after reneating, are put through the quench and subsequent operations. If they then meet specifications, they are accepted.

After springs pass the compression tests and are classified, they are marked with distinctive spray dots to indicate which are for Ford and which for Lincoln and Mercury cars. Springs are then loaded, 120 per crate, for delivery by belt to the shipping dock. Pallet crates used are knockdown type and are returned to Hamilton after unloading at assembly plants.

About one spring in 10,000 is given a fatigue test during which it undergoes 750,000 oscillations. None has ever broken in this test. Other tests included Brinelling about 10 per cent of total production at two points per spring. After hardening, Brinell readings must be 602 to 654 and after tempering 429 to 477.

Recent average production has been about 7200 springs per day on two shifts but as many as 10,000 per day have been made. It is believed that an output of 12,000 per day will be attained when automation changes, now planned, are completed.

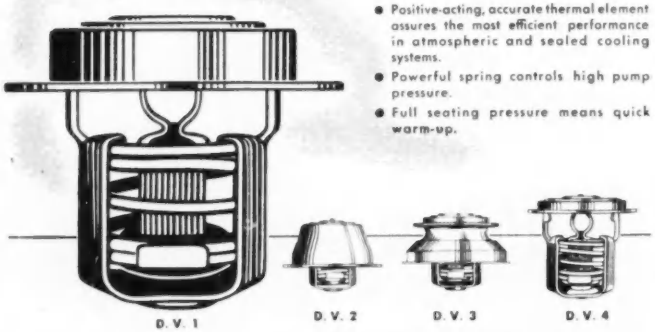
DOLE

DV THERMOSTATS

Fill All Thermal-Control Needs of the Modern Cooling System!

Accepted by Original Equipment Manufacturers—Auto and Truck

Accepted by leading car and truck manufacturers, new-type Dole DV Thermostats are a step ahead in employing entirely new basic principles. DV's are at last, a practical answer to the problems of higher pump pressure, high set pressure caps and resulting high pump efficiency. With Dole DV's, the designer now finds it possible to make the best use of smaller radiators and other advantages of modern engine design. Four basic types provide broad coverage of design needs.



- Positive-acting, accurate thermal element assures the most efficient performance in atmospheric and sealed cooling systems.
- Powerful spring controls high pump pressure.
- Full seating pressure means quick warm-up.

D.V. 1 D.V. 2 D.V. 3 D.V. 4

THE DOLE VALVE COMPANY CONTROL WITH DOLE

1901-1941 Carroll Avenue, Chicago 12, Illinois

Philadelphia • Detroit • Los Angeles

Balancing and Hardening

(*Continued from page 41*)

to an oil quench tank. After a specified number of gears have been fully quenched, the load is removed from a wire mesh basket in the quench tank and placed in a draw furnace where the gears are held at 400 F for an hour. Hardness of the work is held at Rc 49-55.

The other item of interest is the balancing of grey iron camshaft gears in a new Gisholt Dynetric balancing machine at the rate of approximately 42 pieces an hour. Balance is checked and corrected within 0.2 oz in.

In this operation the gear is placed on a spindle and the machine started on its cycle. After locating the region of unbalance as well as indicating the amount of unbalance, the gear is positioned under the drill for balance drilling. Following drilling it is rechecked for balance.

Gas Turbines

(*Continued from page 37*)

certain basic advantages over all others. These include: (1) Uses a readily controlled fluid medium which does not burn, is available everywhere an airplane can fly, and isn't wet; (2) requires a minimum of specialization on the part of the engine and or power plant installation design; (3) results in the smallest possible nacelle configurations; (4) is particularly suited to certain load requirements which are likely to occur in all aircraft.

The foregoing is an abstract of a paper presented at the recent SAE National Aeronautical Meeting held at Los Angeles, Calif.

Michigan WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tubing

Can be Bent

FLANGED, EXPANDED, TAPERED, DEPRESS BEADED, EXPAND BEADED, ROLLED, EXTERNAL UPSET, INTERNAL UPSET, SPUN CLOSED, FORGED, BEVEL FLANGED, FLATTENED, SWAGED, FLUTED

A Quality Product

A SLIDE
AND
A RIDE
Michigan Welded Steel Tubing is used in products that bring joy to children and comfortable and convenient transportation for all.

ROUND

¼" to 4" O. D. 9 to 22 gauge

SQUARE-RECTANGULAR

½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

PRODUCTS for thousands of everyday uses are made better and more economically with Michigan Electric Resistance Welded Steel Tubing. The reasons? Uniform strength, weight, ductility, ID and OD, machinability and weldability. Examine these and many other advantages of using Michigan tubing in the manufacture of your product.

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FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

For Engineering advice and technical help in the selection of tubing best suited to your needs consult us.

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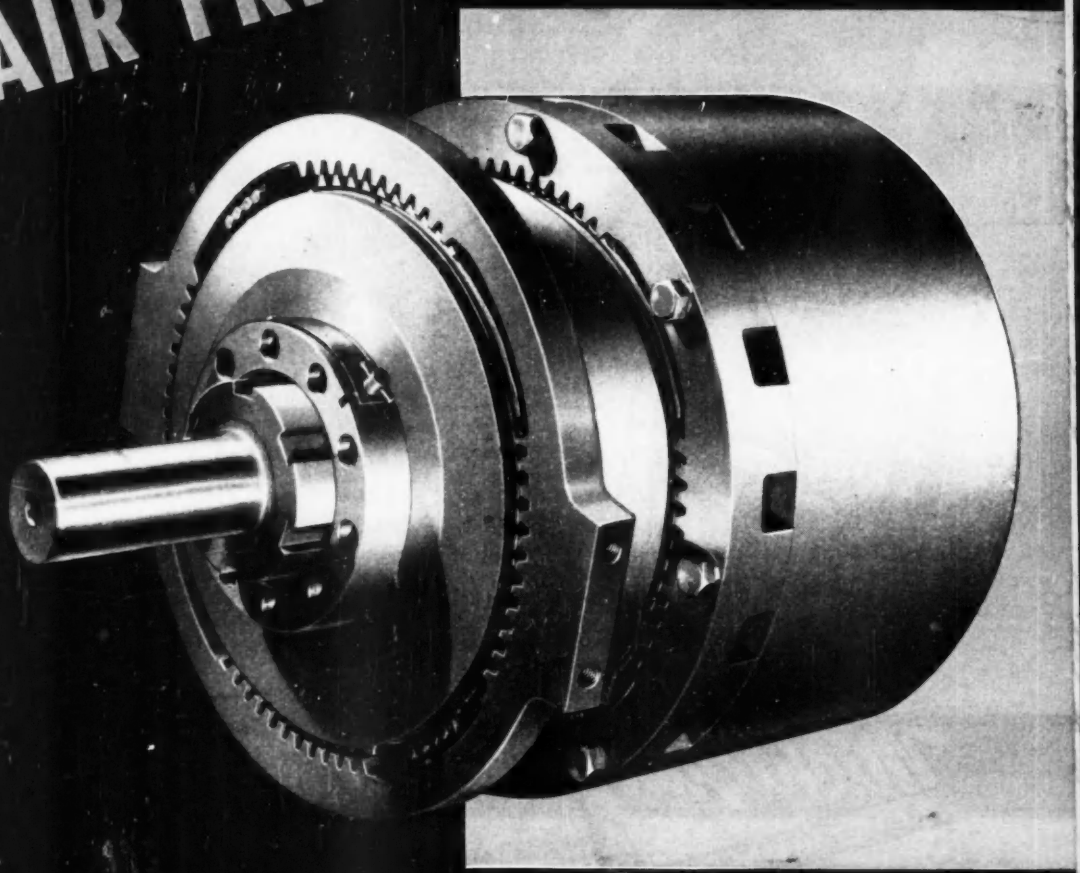
Why This

NIAGARA

AIR FRICTION CLUTCH



NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, N. Y.

is Another Reason for satisfaction with NIAGARA *single and double Crank Presses*

● On single stroking operations where the going is tough, Niagara Air Friction Clutches have met every test of time and service.

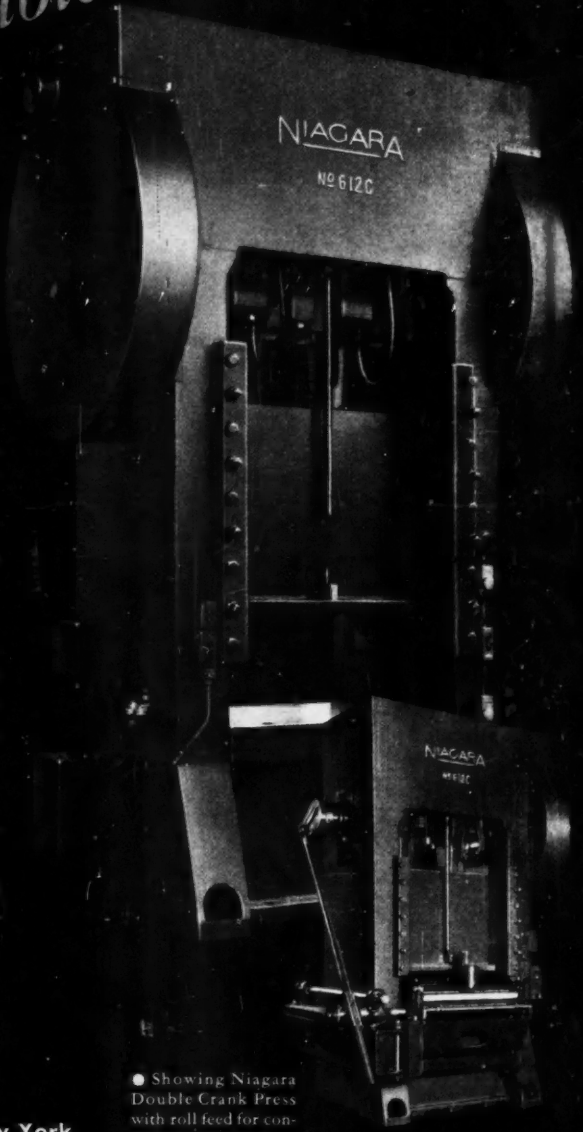
Safe, effortless push button control contributes to maximum hourly output. Controls can be arranged in various ways to suit all operating conditions. Clutch and brake action is instantaneous, smooth and quiet. There can be no overlapping of clutch and brake action. Extra locking palm buttons can be supplied for additional operators.

Pressure on all buttons not locked out of the circuit is required to release the brake and engage the clutch. Release of any one button on the down stroke disengages the clutch and applies the brake causing the press to come to an immediate stop.

Slide can be inched for adjusting dies.

Flywheel mounted on anti-friction bearings. Clutch maintenance is cut to a minimum.

Photographs at right show modern Niagara Double Crank Presses. They are available in a wide range of sizes and capacities.



● Showing Niagara Double Crank Press with roll feed for continuous operation.

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Are you willing to gamble a 3¢ stamp

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• JUST an ordinary 3c stamp may open the way to substantial savings for you—if you use it to send us an outline of your spring requirements. As they often have in the past, our skilled springmakers and practical, experienced engineers may be able to show you how you can reduce your spring costs and perhaps even make it possible to simplify assembly of your product. Accurate's unexcelled facilities and springmaking "know-how" are your best bet for the right spring for your job at the lowest overall cost. And we're prepared to show you the "proof of the pudding."

The sooner you "risk" that 3c stamp the sooner you'll be in line for the "pay-off." Why not do it TODAY?

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A *dependable* source of supply!

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Springs, Wire Forms, Stampings

BOOKS • • •

TOOL ENGINEERS HANDBOOK, by the *ASTE Handbook Committee*, Published by *McGraw-Hill Co., Inc.*, New York, N. Y., price $15.00. This handbook is the first authoritative reference volume prepared under the auspices of the ASTE, that covers all phases involved in the mechanical processing of finished products. All established standards and new techniques and processes—such as the published governmental, associational, and company standards and the latest in tool design, fabrication, maintenance, and utilization—are included in the text. Those associated with product design, cost estimating, the economical selection of machines, processes, and tools, and/or the analysis and improvement of setups and operations in the mechanical manufacturing industry will find the handbook both interesting and helpful.

STYLE MANUAL FOR AMERICAN STANDARDS, Published by *American Standards Association, Inc.*, 70 East 45th St., New York 17, N. Y., price $1.00. This revised edition is a step further in bringing about greater uniformity in style, format, and presentation of technical data, not only in the standards published by the ASA but also in the standards published by sponsors. Writers of technical papers will also find this booklet useful for the preparation and presentation of material.

A PROFESSIONAL GUIDE FOR JUNIOR ENGINEERS, by *William E. Wickenden*, Edited by *G. Ross Henninger*, Published by *Engineers' Council for Professional Development*, 29 West 39th Street, New York, N. Y., price $1.00. This booklet is written primarily for the young engineer. It presents the philosophy and engineering ethics an engineer needs for success as viewed by the author. Advice and suggestions are offered which will help answer personal questions and be an aid in making decisions. The booklet includes a recommended reading list for junior engineers, a self-appraisal questionnaire, and other features that are of interest to the young man who is beginning engineering training or practice.

GAS TURBINES FOR AIRCRAFT, by *F. W. Godsey, Jr.*, and *Lloyd A. Young*, Published by *McGraw-Hill Book Co., Inc.*, New York, N. Y. This book provides a store of information on turbojet and turboprop power plants. In order to give the reader a thorough understanding of the subject matter, the authors have included a number of charts, tables, illustrations, pictures, and some mathematical descriptions. This book will prove useful and interesting to the student of aeronautical engineering and to the engineer in the aviation industry.

ANALYTICAL MECHANICS OF GEARS, by *Earl Buckingham*, Published by *McGraw-Hill Book Co., Inc.*, New York, N. Y. price $10.00. An advanced and thoroughly

(Turn to page 92, please)

Classified Advertisement

Internal Combustion Engine Development: More horsepower from small displacement. Good economy, smooth operation, compact. Higher compression with curb gas. Engine available for demonstration. 15 patent grants and applications. Aged inventor desires outright sale. Box 74, Automotive Industries, 5601 Chestnut St., Philadelphia 39, Pa.

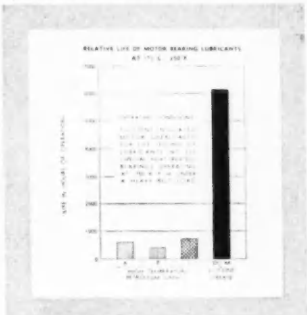
Silicone News

DC SILICONES

IN THE BEARINGS OF ELECTRIC MOTORS

DC 44 SILICONE GREASE CAN SAVE INDUSTRY $45,000,000.00 A YEAR!

Count the number of conventional-type motors you have in your plant. Multiply that number by $4.52 and you have the average yearly cost of lubricating these motors plus the cost of motor failure caused by improper lubrication. That cost is based on a carefully conducted study of motor lubrication and outage costs due to bearing failure in a variety of industrial plants across the country.



With an estimated 10 to 15 million motors now in service, American industry spends 45 to 67 million dollars a year that might be saved by the use of DC 44 Silicone Grease. That possibility is based on the performance of this Dow Corning Silicone grease in about half a million cartridge ball bearings used in a widely advertised line of industrial motors. Experience has proved that these bearings, prelubricated for life with DC 44, require no further attention.

That confirms the testing done by Dow Corning, by bearing manufacturers and by the military establishment. Data such as that shown above indicate that you can expect DC 44 Silicone Grease to last at least 10 times longer than high temperature petroleum greases.

For more information about Dow Corning Silicone Greases, phone our nearest branch office or write for data sheet C-12

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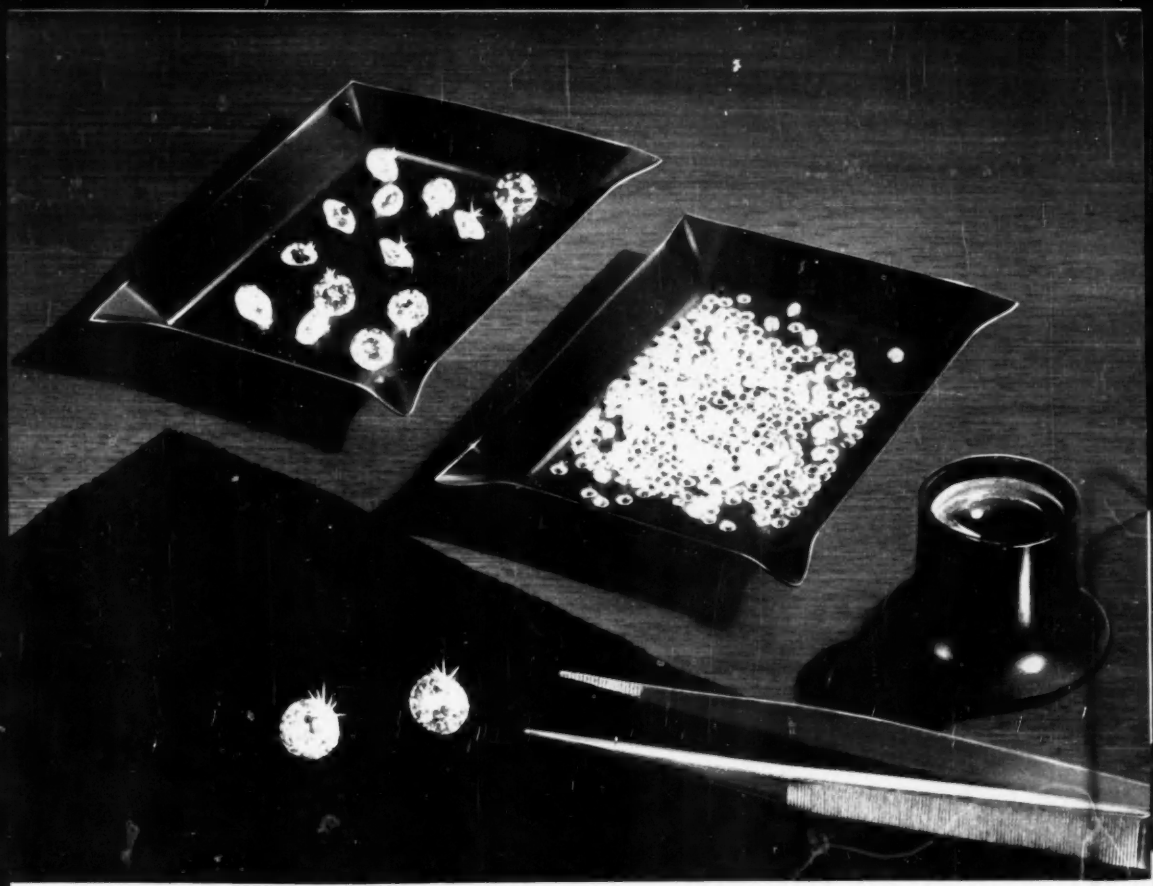

Gems from the collection of Jack M. Wrest

Why did the expert choose these "double diamonds"?

A sparkling pile of precious diamonds—every one of them valuable. But the expert singled out just two—pronounced them perfect—staked a reputation on his decision. His skilled eye detected the flawless transparency, the fiery brilliance that set these two apart from all the rest—the qualities that made them perfect diamonds.

It's very much the same with gears—and of course we're speaking now of "Double Diamond" Gears. Engineers who use gears, and who know gear applications, are quick to identify the basic values that distinguish one gear from another. In the past 35 years hundreds of these experts have selected "Double Diamonds" for as many different power transmission tasks. Why? Because "Double Diamonds" are generally superior gears to a marked degree—whether judged on the basis of design, strength, uniformity, precision, or performance. With the integrity of their own trademarks at stake, engineers and purchasing agents frequently single out "Double Diamonds" from all the rest, knowing that modern equipment and conscientious craftsmanship can produce nothing finer.

Want more facts about "Double Diamond" Gears? Your inquiry will receive prompt attention—either by mail or by personal visit, as you prefer.

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TRADE MARK
GEARS

Made by
Automotive Gear Works, Inc.
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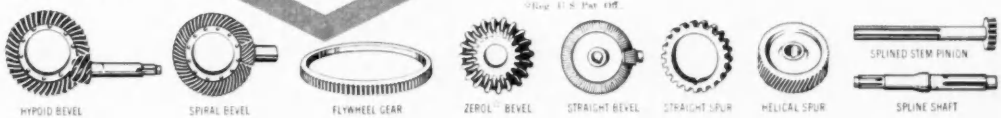
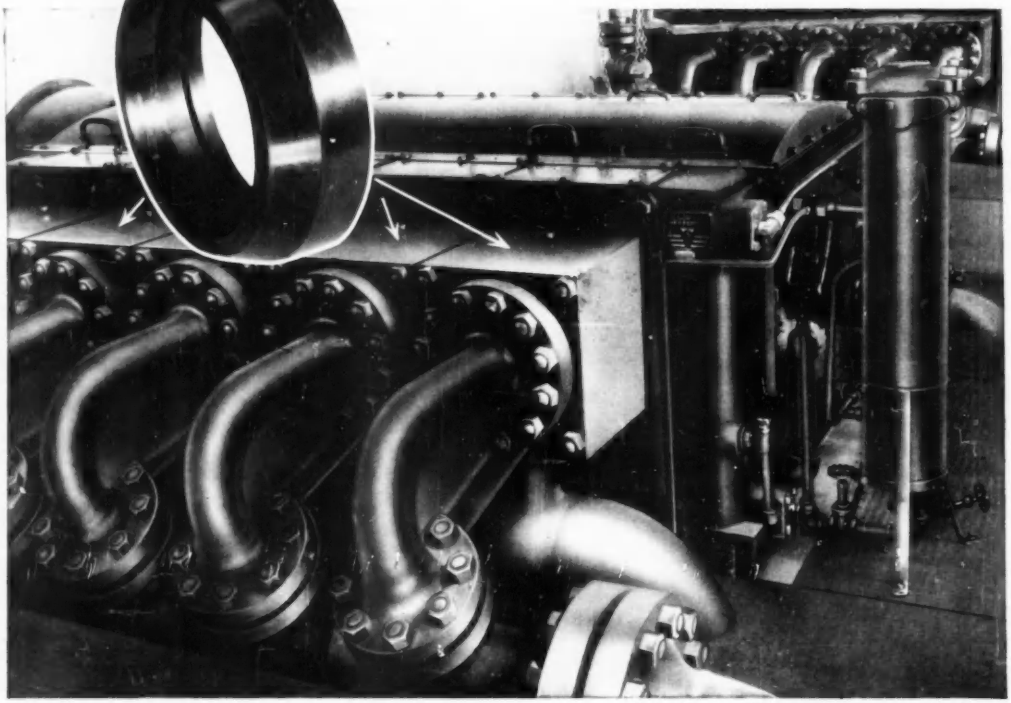


← *Packing molded by The Castle Rubber Co., East Butler, Pa.*



Cooper-Bessemer "Twin Line" high pressure liquid pump.

Packing that can take a beating . . . yet fight off oil, too!

LOSS of pressure and leakage of packing lubricant is a common "pump problem", especially where high pressure is involved. But that problem, along with other headaches, was solved in the revolutionary "Twin Line" high pressure liquid pump pictured here. For one of this pump's important features is a well designed plunger sealing ring or packing molded from a Hycar American rubber compound.

These pumps are used wherever liquid is pumped against high pressure—for example, in oil pipe lines, in descaling service in steel mills and in many other fields. The plunger sealing ring, under these severe service conditions, must possess extreme oil and abrasion resistance, low compression set, and excellent aging properties. That's why Hycar was chosen.

Pressure is maintained and lubricant leakage is prevented because the Hycar packing provides lip-type contact with the pump plunger in two directions. The plunger travels at terrific speeds. When operating, one lip of the Hycar packing seals against the pump discharge pressure. The other lip seals against inward leakage of the packing lubricant.

Hycar
Reg. U.S. Pat. Off.
American Rubber

This packing is another example of a tough problem solved because of the unusual combination of properties which Hycar provides. For Hycar resists oil, gas, heat, weather, and wear—and Hycar compounds have excellent resistance to flow under high pressures.

Versatile Hycar may be just what you need to improve or develop a product—to solve a problem—and bring more sales dollars *your* way. It is used as a base material . . . as a plasticizer for polyvinyl resins . . . as a modifier for phenolic resins . . . as an adhesive base . . . as a latex for coating or impregnating. Write for information. Please address Dept. **HC-12,** B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Studebaker Automatic Transmission

(*Continued from page 30*)

the other hand, starting with full accelerator depressed past detent, the transmission can be held in second up to 58 mph, the pedal overruling governor spring pressure up to this speed.

Positive elimination of creep has been effected by the introduction of a solenoid-controlled check valve mounted back of the master cylinder, located in about the same position as the usual hill-holder. When coming to a stop in traffic with engine running and transmission in gear, the brake application has the effect of trapping about 200 psi pressure in the lines to the rear wheel cylinders, keeping the rear wheel brakes applied, when the brake pedal is released. The no-creep system also includes a pressure switch on the transmission, operated by pressure from the rear pump only. Contact in the brake system is broken when pressure exceeds 20 psi, thus rendering the no-creep inoperative when the car is in forward motion. In addition, the electrical circuit for the solenoid and pressure switch is completed to ground through the carburetor idle speed adjusting screw which contacts a lead from the solenoid when the throttle is closed. The first movement of the throttle breaks the circuit to release brake pressure. Thus no-creep is safeguarded both by pressure in the transmission and carburetor throttle movement to provide instantaneous release.

Mention was made earlier of the "lock-up" to prevent rolling back on steep grades. In this maneuver—which is fully automatic and positive—consider that the transmission is in second gear in which case the sun gear of planet "B" is kept from rotating through rear free-wheel unit "D." Now with the engine at idle and transmission in second gear phase, as the car tends to roll back the output shaft also tends to rotate in reverse direction. But the cam of free-wheel unit "D" can free-wheel only clockwise viewed from the front in this phase and will lock if turned counterclockwise. Hence any tendency to roll is resisted by locking up of the free-wheel unit and the vehicle will remain fixed on the grade without use of brakes and without operator action of any kind.

It is of interest to examine some of the shift characteristics of this transmission. Lock-up into first gear for coasting downhill may be done at any speed up to 40 mph with throttle closed without damage to the unit or discomfort to passengers, but it is not recommended above 20 mph with any throttle opening. Thus it is desirable to take the foot off the accelerator pedal for this maneuver.

Automatic power shifts vary with throttle position. With light throttle the shift from second to direct occurs at about 18 mph; with throttle wide open but not depressed past detent the shift is made at 35 mph; with throttle wide open and past detent, the shift is deferred to around 58 mph.

For automatic down - shifts, with closed throttle or coasting conditions, the shift from direct to second takes place at 12 mph; with throttle wide open and depressed past detent the compulsory shift is made at speeds up to 50 mph.

Mention was made earlier of deliberate design to facilitate service operations. The following will illustrate how well this goal was attained. If it is necessary to remove the entire transmission, but without removal of the converter assembly, all that is required

(*Turn to page 88, please*)

Manufacturers of...

HARDENED and GROUND PARTS

for over 40 years

SINCE the day of the duster and goggles, The Brown Corp. has meant highest quality precision parts for the automotive industry. Today, Brown Parts serve trucks, tractors, trailers, buses, axle builders, off-the-road machines and Diesel locomotives. The production methods and facilities we have developed are unexcelled — uniform product quality is assured—deliveries are reliable—service is efficient. Ask any of our long list of satisfied customers throughout the industry.

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Henry W. Brown

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Parts include . . .
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Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th-Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

THE BROWN CORP.

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C. H. Ehlert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 5252 Broadway, Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Elmer L. Kingsland, 6888 Beechley Ave., Long Beach, Calif. • J. B. Hunt, E. L. Kingsland Co., 5611 S. E. Yamhill St., Portland, Ore.

Manufacturing an Automobile in Australia

By W. E. Hill,
Asst. Overseas Mgr.,
General Motors Overseas Corp.

IN the latter stages of World War I Australia found herself greatly handicapped by lack of shipping space. The German submarine campaign had taken its toll of British shipping. Australia needed ships to move her wool and wheat to European markets and those same ships were needed to bring to her the supplies of materials and manufactured goods on which she was so dependent.

One way of conserving space on the ships enroute to Australia was to eliminate the bulky motor car bodies which were beginning to flow to the country in steadily increasing quantities from the United States. The Australian Government, therefore placed an embargo upon the importation of complete motor car bodies.

This act, which took place in 1917, brought into being the body building industry. Those who undertook to manufacture the needed bodies were promised tariff protection at the termination of the war to protect the investment they were making in plant and facilities. And so, the automobile industry was started.

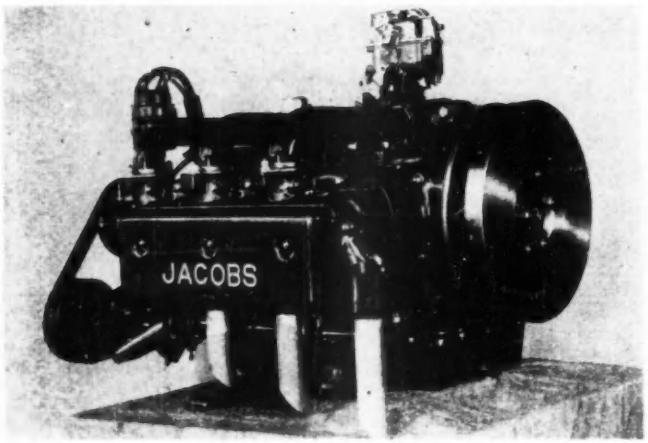
With the coming of World War II, Australia found herself again isolated from important parts of the world, and once again forced to rely upon her own resources for much of her manufactured needs, including armaments with which to arm her soldiers and defend herself. The experience of World War I was repeating itself in even more intensified form.

By 1944 the tide of battle had definitely turned in favor of the Allied Forces, and it was in that same year that the Australian Government began to review once again the desirability of manufacturing a car in Australia, reviving efforts which had been put in motion at the beginning of the War, but deferred for the return of more opportune circumstances. We wrote to the Prime Minister of Australia in January 1945, and told him we were prepared to embark upon the manufacture of a car. We asked for no special protection, subsidies, or bounties, feeling that a project of this kind should stand or fall on the commercial soundness of the project. We did ask for the full cooperation of the departments of the Government with which we would have to deal, and we did stipulate that any special consideration extended to anyone else proposing to build a car should also be extended to us. We also asked that we be permitted to import components or accessories for original equipment equal to 10 per cent of the established list price, or 5 per cent by weight.

Our first step was to make a complete on-the-ground survey to determine what specifications were required in a car specifically tailored to meet Australian conditions. This study covered a period of about a year and disclosed that the car should be somewhat smaller than the American Chevrolet, but larger than the smaller European and English cars; that it should have more road clearance than the average car in order to negotiate the rough roads in the back country; that it should have better hill-climbing performance in high gear than the lower horsepower English cars; that it should be as dust-proof as possible for a country of high winds and dust; that it should be extremely economical in fuel consumption, since Australia imports all of its petroleum products which are heavily taxed and severely rationed, and that it had to be light in weight in order to gain the needed fuel economy, but extremely rugged to give it long life and to withstand wear and tear.

New JACOBS MARINE ENGINES

MORE POWER . . . LESS WEIGHT . . . PRICED RIGHT



HORIZONTALLY OPPOSED LIQUID COOLED

6 CYL. 150 HP.
Displacement 361 cubic inches
Weight (Dry) 425 lbs.
Bore 4.375" Stroke 4.000"
Length 34" Width 32" Height 30"

4 CYL. 100 HP.
Displacement 241 cubic inches
Weight (Dry) 330 lbs.
Bore 4.375" Stroke 4.000"
Length 27" Width 32" Height 30

We have applied the knowledge and experience gained in over 20 years in manufacturing aircraft engines to the designing and production of these two new and revolutionary marine engines. They have been built to aircraft specifications and quality, and fully tested for all types of marine use. Write us today for complete details.

JACOBS AIRCRAFT ENGINE COMPANY
Manufacturers of Aircraft Engines Since 1929
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Australians keep their cars over much longer periods than we do.

With these general specifications in hand, we turned to Detroit where the full cooperation, facilities, manpower and technical know-how of General Motors Corporation were placed at our disposal. Specialists in motor car design, engineering and styling were assigned to the project by the corporation, and some 30 engineers and technicians from our Australian operations were brought to the United States to gain experience during development stages. After much work and study a car was designed to meet these specifications, and three prototype cars were built and thoroughly tested at the General Motors Proving Ground.

When the pilot models had proved satisfactory in this country they were taken to Australia together with the personnel. Seventy-eight people returned to Australia on one boat in 1946. In the meantime, the manufacturing plants had been designed, the machinery purchased and shipped to Australia, so that the plant facilities were well under way when the pilot models arrived.

An eighty-six mile test course was laid out, including every type of road condition which a car might reasonably be called upon to meet, and the prototype cars were driven over this course day after day, under controlled operation. Three more pilot models were built in Australia and subjected to the same rigid tests. In this type of controlled driving, each mile is equivalent to about four miles of ordinary driving. From time to time the cars were taken down, the parts inspected, and the inevitable specification changes made as actual usage dictated. The new car was shown to the public of Australia on Nov. 29, 1948 (see Dec. 1, 1948, issue of AUTOMOTIVE INDUSTRIES).

5W Engine Oil

(*Continued from page 35*)

As Mr. Anglin has pointed out, if 5W is defined only by the viscosity at 0 deg F, "it is possible to produce within this specification oils of widely varying characteristics, some of which might not be suitable lubricants, even for light passenger-car service."

I believe that, if the API, through its lubrication committee, or by some other suitable means, could establish the same policies which have already been established in Canada, it would be of great value to the oil and automotive industries and to the general public which these great industries serve.

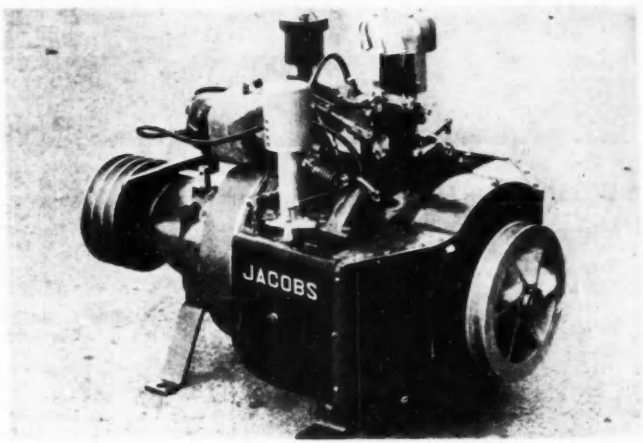
Discussion by Carl W. Georgi,
Quaker State Oil Refining Corp.

SUGGESTIONS that rigid specifications be set up for engine oils or other lubricants, whether these originate from within or without our industry, always imply that petroleum refiners and marketers are so ignorant, or so careless, of their responsibility to the consuming public, as well as of their own welfare, that they need fixed and rigid guides for making their products. Certainly, the industry's record of supplying quality products, and of constant quality improvement, does not justify such thinking, suggestions, or implications.

In the first place, quality specifications invariably tend to become fixed and rigid. The record of our industry, in the vast sums spent yearly for research and development as well as for the continual advancement in quality improvement, is the exact opposite of anything suggesting rigidity or resistance to change.

The research and development departments of the oil industry, as well as the men who market oils and who thereby accept responsibility for their performance, are thoroughly familiar with the quality requirements of engine oils, and with the particular emphasis on quality required in the very light 5W grade. I am confident that the 5W oils now being marketed, or to be marketed in the future, will fully meet or exceed the quality requirements of service performance — without resort to formalized and rigidized quality specifications.

JACOBS
Introduces
LIGHT WEIGHT INDUSTRIAL ENGINE



The O-60A 2 CYL. Horizontally opposed, air cooled, 15-20 HP. —60 cu. in. displacement, Bore 3.5", Stroke 3.0", Weight 150 Lbs., Length 25", Width 19", Height 18". Aluminum Alloy Construction.

Many manufacturers of agricultural implements, stationary equipment, road and construction machinery are excited over the power delivered by this light weight 2 cylinder engine. Let us tell you more about it. Write or wire us today for complete details.

JACOBS AIRCRAFT ENGINE COMPANY
Manufacturers of Aircraft Engines Since 1929
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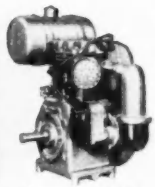
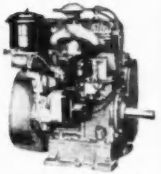
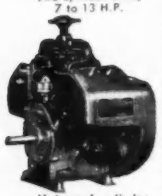
WISCONSIN
Heavy-Duty *Air-Cooled* Engines
Offer Reputability
TO MATCH YOUR OWN . . .



Single cylinder sizes 3 to 6 H.P.



Two cylinder sizes, 7 to 13 H.P.



V-type 4-cylinder sizes, 15 to 30 H.P.

If your company manufactures power-operated equipment of any kind that can utilize engine power within a 2 to 30 Horsepower range . . . your good name is safe when the performance of your equipment is entrusted to Wisconsin Air-Cooled Engines.

Here is reputability to match your own, no matter how high or exacting your standards may be. Every Wisconsin Engine from the smallest to the largest is of heavy-duty design and construction. The perfectly balanced drop-forged crankshaft of every Wisconsin Engine runs on tapered roller bearings at *both* ends to take up end- and radial thrusts . . . a typical detail of Wisconsin heavy-duty design that assures the user "Most H.P. Hours" of on-the-job service.

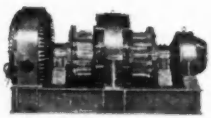
Wisconsin Heavy-Duty Air-Cooled Engines are available in 4 cycle single cylinder, 2- and 4- cylinder types in a complete power range up to 30 H.P.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 14, WISCONSIN

What makes H-VW-M low voltage GENERATORS so efficient...?



P. R. LYONS
Manager of Electrical Sales
H-VW-M COMPANY

Trouble-free commutation is achieved in H-VW-M low-voltage generators by such outstanding features as fully-insulated brush holders and rigging . . . use of copper pig-tail bars eliminates current passage through springs and fingers which in turn considerably increases brush life . . . one piece brass casting for correct brush box alignment . . . radial adjusted brush holders and rigging to provide firm and permanently correct positioning of the brushes.

H-VW-M generator brushes are made of special copper graphite, constructed to insure highest conductivity along the path of the current. Moulded-in "equaload" shunts distribute brush load equally.

To these construction features are added such refinements as fan action of commutator risers to increase ventilation of field and rotor coils . . . rolled steel ring set within frame to lower center of gravity . . . liberal size, sleeve-type bearing to insure quiet, trouble-free life.

For increased efficiency and low cost power production investigate H-VW-M motor generator sets. You'll find the complete story in Bulletin G-102—yours for the asking.

SINCE 1870

Hanson-Van Winkle-Munning has supplied the plating industry for over 70 years. Our sales-engineers are thoroughly familiar with every step in the process of electroplating and polishing. It is this overall knowledge that has made H-VW-M "Headquarters" for electroplating and polishing equipment, supplies and technical assistance.

HANSON-VAN WINKLE-MUNNING COMPANY
MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing equipment and supplies

Plants: Matawan, New Jersey · Anderson, Indiana
Sales Offices: Anderson · Chicago · Cleveland · Dayton · Detroit
Grand Rapids · Matawan · Milwaukee · New Haven · New York · Philadelphia
Pittsburgh · Rochester · Springfield (Mass.) · Stratford (Conn.) · Union

7351

Studebaker Automatic Transmission

(*Continued from page 85*)

is to detach the propeller shaft at the transmission end, detach control connections and remove four fastenings at the torque converter mounting. The entire unit can then be slid out onto a transmission jack. This operation has been timed at 20 minutes, the major allotment of time being to drain the unit of oil.

Considerable service work, including replacement of elements, can be done without removing the transmission. For example, band adjustments are made externally. Servo units are mounted separately on each side of the case and may be removed simply by detaching a few fastenings. Governor and governor controls can be replaced by detaching the propeller shaft at the output end and removing the rear housing as a unit. The front pump too is an integral unit housed at the front end and can be readily removed when the transmission has been taken out.

It is anticipated that at the start, all of the separable units mentioned above, including the valve body under the case, will be replaced by a service unit instead of attempting to replace parts or rebuilding.

The transmission requires 11 qt of 10W motor oil. A complete unit weighs 220 lb, less oil. It replaces the conventional flywheel, clutch, and overdrive transmission units weighing 189 lb. Overall length is about 3¼ in. shorter than the Commander overdrive transmission and bell housing.

Army Recommends Switch to Commercial Vehicles

The Army Equipment Policy Board has recommended that military equipment be simplified. Of particular interest to the automotive industries are the suggestions that commercial type vehicles instead of administrative vehicle be used in posts, camps and stations, and that commercial type cargo carriers be used in communication zones and theaters of operation.

AIRBRIEFS

(*Continued from page 72*)

always be assumed that the men at the top make their decisions on the basis of careful technical study, who's to say that national pride, company prestige or perhaps a personal "grudge" is not responsible?

Left—5 of the 55 pieces of luggage in the smart Samsonite line. All are now equipped with lustrous, solid brass fittings to make Samsonite Luggage look better longer.

For Automotive Engineers

In this day of rising costs, every industry is seeking more efficient, more economical materials.

This is one of a series of messages showing how engineers in other industries are cutting costs or improving their manufacturing techniques with Revere Metals.

We hope that it may contain the germ of an idea that will be helpful to you.

Samsonite Luggage

SWITCHES TO SOLID BRASS FITTINGS . . . TO MAKE THE "WEAR SPOTS" ON ITS LUGGAGE STAY SMARTER LOOKING LONGER.

Revere Brass Strip selected for its unusually fine, uniform grain after hardware is formed.

● The name Samsonite has become synonymous with quality luggage the country over. It has a reputation to uphold. For that reason, when the brass plated fittings with which this luggage was initially equipped, started to tarnish and show signs of premature wear, the Samsonite people did a double-take. After consulting with their own engineers and the Revere Technical Advisory Service it was decided that nothing less than solid brass would be in keeping with so fine a line of luggage. Revere Brass Strip, because of its very fine uniform grain, was selected for the job.

Samsonite was extremely pleased with the results. They found that after the luggage hardware was formed it had just the lasting, lustrous quality they were looking for. A fitting companion for the smart Samsonite cases. Now, all external hardware and the internal fittings, where rusting would be detrimental, are of solid brass. Even the keys, usually stamped, are of solid brass, coined and milled.

Perhaps Revere Brass or some other Revere Metal can be of help in improving your product—cutting your production costs. Why not tell Revere's Technical Advisory Service about *your* metal problems? Call the Revere Sales Office nearest you today.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

NEARLY 600,000 PIECES

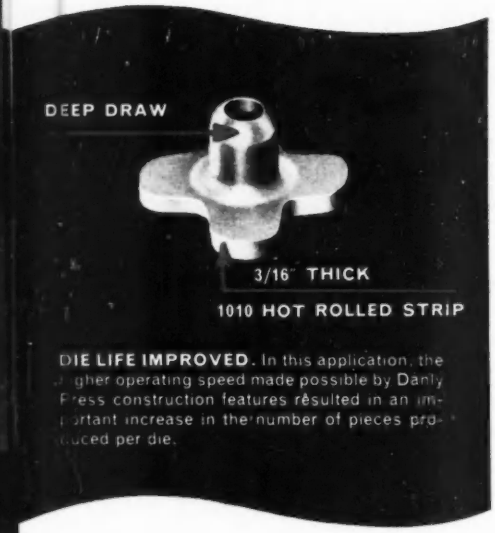
...a new production record made possible by higher press operating speeds

Deep drawing heavy gage coil stock at high speeds on progressive dies is a real test for a press. In this operation, like the one shown, a Danly Autofeed is achieving shift production running close to 4000 units in spite of time required for restocking and die changing.

And in the matter of die life, this production average speaks for itself. Precision closure and extra rigidity built into this Danly Autofeed assure longer runs before die sharpening is required.

Danly Presses Run Longer

Records like this are made possible by exclusive mechanical features found only in Danly Presses. First, there is the new Danly cool-running clutch, designed to outwear conventional press clutches because less destructive heat is generated. And a special forced air cooling system keeps the clutch operating temperature only 35° above room temperature. Other advantages include positive pressure lubrication throughout and sensitive control reaction to facilitate die try outs.



DIE LIFE IMPROVED. In this application, the higher operating speed made possible by Danly Press construction features resulted in an important increase in the number of pieces produced per die.

CHECK THESE
EXCLUSIVE DANLY PRESS FEATURES

- ✓ cool-running clutch
- ✓ extra rigidity
- ✓ complete pressure lubrication
- ✓ special controls—sensitive reaction
- ✓ precision construction

SEND FOR THIS FREE BOOKLET . . .
and see for yourself how DANLY AUTOFEED presses offer the advantages of automatic feeding over a greatly expanded range . . 50 to 800 tons.

MECHANICAL PRESSES...50 TO 3000 TONS

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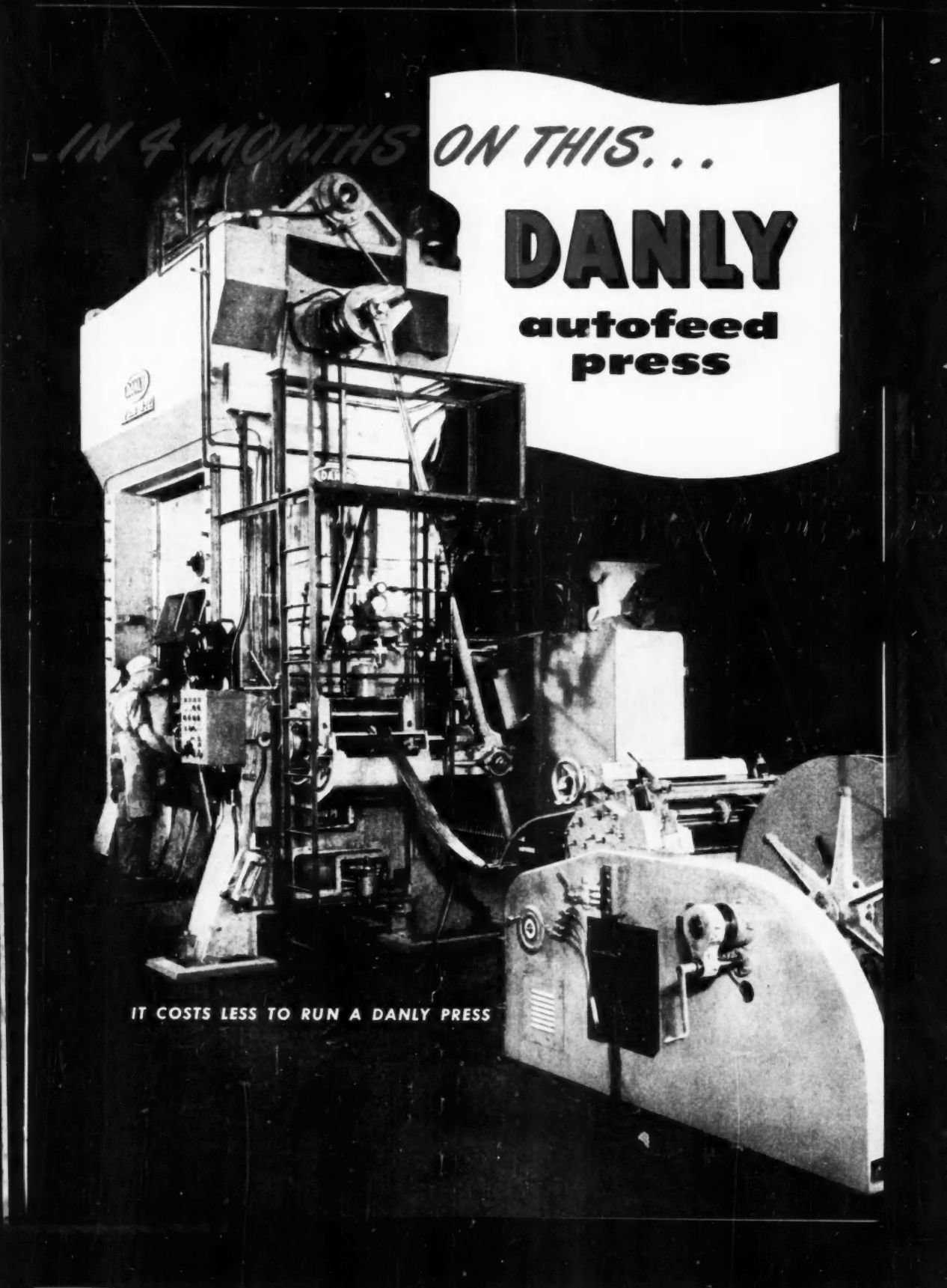
DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue, Chicago 50, Illinois


...IN 4 MONTHS ON THIS...
DANLY
autofeed
press
IT COSTS LESS TO RUN A DANLY PRESS

STUART'S WISE ECONOMY PLAN

A SCIENTIFIC COST REDUCING PROGRAM

good cutting fluids properly applied

Write, wire or phone for details.

D.A. Stuart Oil Co.

2733 S. Troy st., Chicago 23, Ill.

BOOKS ...

(Continued from page 82)

definitive treatise on analytical mechanics devoted entirely to a single type of mechanical element with a purely mathematical and analytical approach. The text covers the whole field of uniform transmission of motion and power by means of gears of all types.

THE STORY OF MAGNESIUM, by *W. H. Gross*, Published by *American Society for Metals*, 7301 Euclid Avenue, Cleveland, Ohio, price $2.00. This book gives a complete story of the expansion, methods of extraction, properties, fabrication, and uses of the world's sixth most plentiful element. Although written by a metallurgical expert, it is designed for the layman rather than the scientific or technical specialist. There are many illustrations and diagrams which make excellent reference material.

HOT-TINNING, by *W. E. Hoare*, Published by *Tin Research Institute*, Fraser Road, Greenford, Middlesex, England. This booklet gives the working instructions for the production of hot-tinned coatings on fabricated articles and components. Due to the practical nature of the text, it meets the needs of the operator, foreman, engineer, and designer. The text not only includes revisions of the original publication in 1940, but describes methods which have been developed since that date.

ELECTRICAL ENGINEERS' HANDBOOK—ELECTRIC POWER, by *Pender and Del Mar, Wiley Engineering Handbook Series*, Published by *John Wiley & Sons*. The fourth edition of this well known handbook is devoted entirely to electric power, supplemented by sections on fundamental theory, a collection of useful tables, and an extensive bibliography. The new edition has been expanded and revised through the efforts of 71 specialists in various fields. The material has been logically arranged in 19 separate sections and includes the latest information on a variety of equipment items such as rectifiers, aircraft equipment, heat pumps, permanent magnets, and induction heating.

THE INDIANAPOLIS RECORDS, by *Alan Hess*, Published by *Stuart & Richards*, London, England. This book is a complete story of the successful attempt to set up seven-day records with an English Austin car on the Indianapolis track. The fact that this English car was accepted as a stock model, merely on the declaration of the manufacturer, and that the records were authenticated after a final examination, is something which the British drivers thoroughly appreciated. The book is well illustrated both in black and white and in colors.

AIRPLANE PERFORMANCE, STABILITY, AND CONTROL, by *C. D. Perkins and Robert E. Hage*, Published by *John Wiley & Sons*. Dealing with elements of applied aerodynamics, the book is divided into two parts—the problems of airplane design for performance, including an interesting section on propulsion machinery; and the design of the airplane for adequate stability and control. In the first part basic aerodynamics is summarized to permit an estimation of airplane drag for subsonic, transonic, and supersonic speeds. The second part deals fully with what is said to be the comparatively new art of designing the airplane for flying qualities and in this practical treatment only subsonic flight is discussed.

REVIEW OF CURRENT RESEARCH AND DIRECTORY OF MEMBER INSTITUTIONS, Published by *Engineering College Research Council*, University of Iowa, Iowa City, Iowa, price $1.75. Composed of material from 82 educational institutions which hold membership in the Research Council, this book lists over 4000 current college and university research projects in engineering subjects. Besides giving the research projects now active, it also lists research policies, research personnel, research expenditures, and short courses and conferences currently active at each institution.

NATIONAL TRANSPORTATION POLICY, by *Charles L. Dearing and Wilfred Owen*, Published by *The Brookings Institution*, Washington 6, D. C., price $4.00. This book is based on a study of federal transportation activities which have become major factors in current transport development and control. Recommendations are made for reorganization of federal agencies and the establishment of a transportation department by the Government in order to promote the development of water, rail, highway, and air transportation.

BUY BONDS

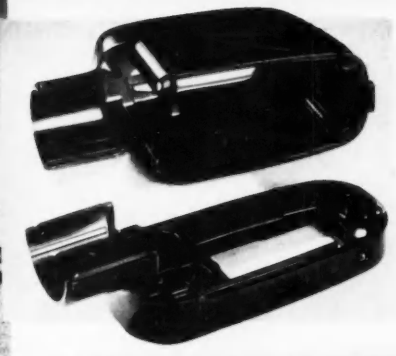
HARDNESS TESTING

The STANDARD SCLEROSCOPE (Now highly Improved) for more than twenty years has made good and is still used for doing the world's hard work in testing. In general use for specifications purposes. Simple, Sturdy, Comparatively Inexpensive. Illustrated bulletins free. FOR QUALITATIVE AND QUANTITATIVE HARDNESS MEASUREMENT, under Static Pressure, the MONOTRON is the only machine now available. Operative up to over 2000 Diamond Brinell. Avoids errors due to spring in test pieces. Takes readings with the load on, avoiding reversal lash errors. No setting to zero. Operates at highest Speed. Has solved many old laboratory and shop problems. *We also make the Durometer for testing the hardness of rubber.* Comprehensive bulletins free.

THE SHORE INSTRUMENT & MFG. CO.

Van Wyck Ave. and Carll St., Jamaica, New York, N. Y.

Agents in all Foreign Countries



BAKELITE NEWS NO. 8

NOTES FROM BAKELITE CORPORATION ON BETTER, FASTER, LOWER COST PRODUCTION WITH "BAKELITE" PLASTICS

BAKELITE Phenolics Make WARM FRIENDS!

❶ Looking for a strong, lightweight, heat-resistant material? Your warm-friend-in-need may well be a BAKELITE Phenolic Plastic—as it is for this "Kodaslide" Projector, from Eastman Kodak. Its lens mount, barrel, top, and bottom, are rapidly and inexpensively molded with a smooth, lustrous finish that requires a minimum of finishing. All parts are assembled quickly. A plus value is its excellent electrical resistance. Do these good-looking projectors suggest the use of BAKELITE Phenolics in the parts or products you manufacture?

Molders: Auburn Button Works, Inc., and Waterbury Button & Mfg. Co.

SALES Compelling Premiums Need Premium Quality Plastics

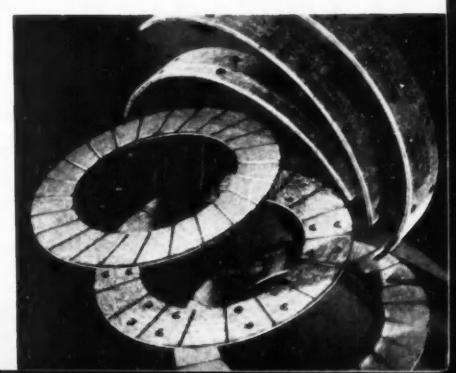
❷ That's why BAKELITE Styrene Plastics are used in the rear-view mirror glare shields included as premium offers with S. C. Johnson & Son's famous "Carnu" auto polish. BAKELITE Styrene Plastics come in virtually every color, transparent, translucent or opaque. They mold easily to close tolerances and fine detail—providing smooth, lustrous surfaces. They are ideal for toys, games, packages, novelties, premiums, brushes, combs, a thousand and one things.

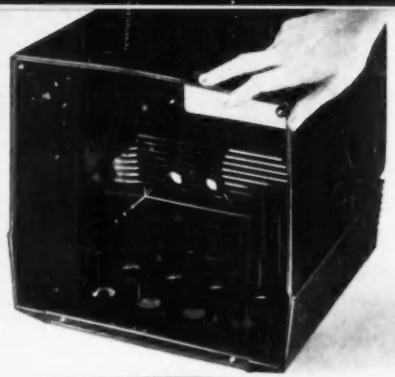
Molder: Armstrong Products Co.

BAKELITE Bonding Resins Help Nearly EVERY INDUSTRY!

❸ Take these "Rusco" brake linings bonded with BAKELITE Phenolic Resins by the Russell Manufacturing Co. Longer service life is demonstrated, for example, on New York City taxicabs where they last nearly three times longer than linings formerly used. Clutch facings last longer, too. It's typical of the way the great variety of BAKELITE Bonding Resins are adding life and efficiency to many products such as abrasive wheels and sandpapers, and glass, mineral and vegetable fiber thermal insulation, storage battery plate separator retainer mats, and tuft binders for carpets and rugs. As sand core bonds for ferrous and non-ferrous metal castings, they're speeding foundry operations, lowering costs.

MORE BAKELITE NEWS ON NEXT PAGE





A BETTER TV Cabinet at LOWER COST

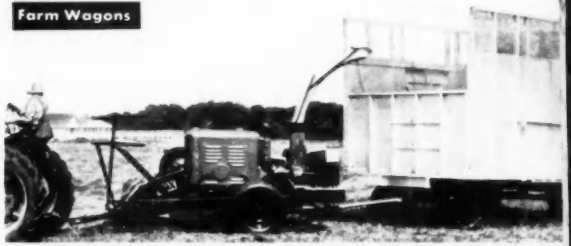
❹ Philco Corporation accomplished just that—with BAKELITE Plastics. Easily and inexpensively molded, the BAKELITE Phenolic cabinets of Philco's new 7 and 10 inch direct-view table-type TV sets permit fast mass production at lowest cost. The cabinets are molded in one piece with all lugs, chassis mountings, and openings completed at the same time. Color and permanent lustrous finish are self-contained. The lower cost helps bring television to more people which means broader markets for Philco.

Molders: General Industries Co., and American Insulator Corp.

Immense New ADVANTAGES in Plastic-Surfaced PLYWOOD!

❺ Paper-plastic surfacing offers these qualities to plywood: Armor-clad resistance to wear and weathering, higher tensile and flexural strengths, greatly decreased moisture absorption, and a better surface for painting. Kimberly-Clark Corp. impregnates a special paper stock with water-soluble BAKELITE Phenolic Resins. Sheets of this "Kimpreg" material are then laid up with the glue-spread assembly of wood plies. The lay up is cured in a hot press. The paper-plastic surfacing is anchored permanently to the plywood. The resultant product is sold by Georgia-Pacific Plywood and Lumber Co. as GPX Plastic Plywood. It is widely used for concrete forms that can be re-used many times; shipping cases, farm buildings and wagons, production-line chutes and tables, marine decking, linings for freight cars and trucks, and sidings for buildings.

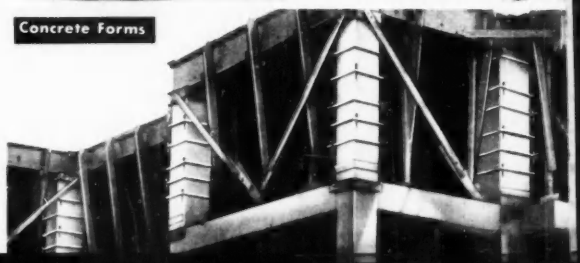
Farm Wagons



Shipping Cases

Delivery Truck Shelves

Concrete Forms



Bakelite
TRADE MARK
PLASTICS

BAKELITE CORPORATION

Unit of Union Carbide and Carbon Corporation UCC

30 East 42nd Street, New York 17, N.Y.

Design Changes Are Easy with Versatile, Adaptable Plastics!

Check coupon below for information on specific subjects illustrated. For general information, write for copy of Booklet G-B, "A Simplified Guide to BAKELITE and VINYLITE Plastics."

BAKELITE CORPORATION, Dept. C-22
30 East 42nd Street, New York 17, N.Y.

Please send information on subjects checked below:

- ☐ 1. BAKELITE Phenolic Plastics
- ☐ 2. BAKELITE Styrene Plastics
- ☐ 3. BAKELITE Bonding Resins
- ☐ 4. BAKELITE Phenolic Plastic Cabinets
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City ..... *Zone* ..... *State* .....

Sealing ring with plain butt joint.
Oil Seal Rings...
Sealing ring with step cut joint.
(All rings are shown here actual size)
FOR AUTOMATIC TRANSMISSIONS
Sealing ring with plain butt joint.
Oil seal rings of various designs and sizes are vital parts of today's automatic transmissions. When automatic transmissions were still in the experimental stage, it was only natural that their designers should bring their sealing ring problems to Muskegon, a leading producer of cast iron piston rings. Muskegon's knowledge of the material and finish requirements for rings of this type makes it "OIL SEAL RING HEADQUARTERS." Here, designers can make full use of Muskegon's experienced engineering service. Here, purchasing agents can discover economies made possible by Muskegon's facilities for high precision, mass production of cast iron rings. Write us today about any sealing ring problem you may have.
Muskegon Piston Ring Company, Muskegon, Michigan.
OIL SEAL RING HEADQUARTERS
Sealing rings with locked joints. (Enlarged view shows locked position)
Policy
"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."
MUSKEGON Piston Rings
MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA
"THE ENGINE BUILDERS' SOURCE"
Sealing ring with step cut joint.

The features you get with Mayari R

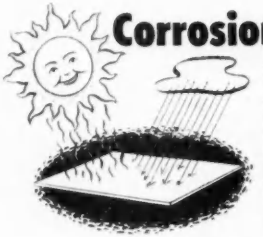
This versatile high-strength, low-alloy steel is helping to improve the designs of a great variety of products including railroad cars, motor vehicles, industrial equipment, fabricated structures and household items. For full information on the properties and applications of Mayari R write for a copy of Catalog 259.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

BETHLEHEM STEEL

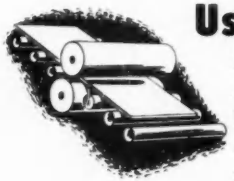
High strength

The 50,000 psi minimum yield point of Mayari R is approximately double that of plain carbon steel, permitting higher working stresses.



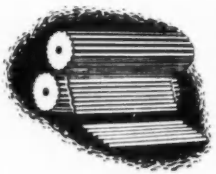
Corrosion-resistance

The atmospheric corrosion-resistance of Mayari R is 5 to 6 times that of plain carbon steel and 2 to 4 times that of copper-bearing steel.



Used as-rolled

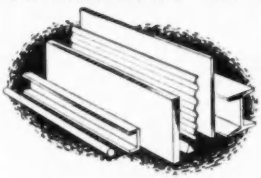
It has advantages of alloy steel without the expense of heat-treatment. Mayari R can be worked hot or cold in the as-rolled condition.



Workability

Mayari R can be formed, sheared, punched, drilled, and welded by the methods used for carbon steel.

Available in many forms

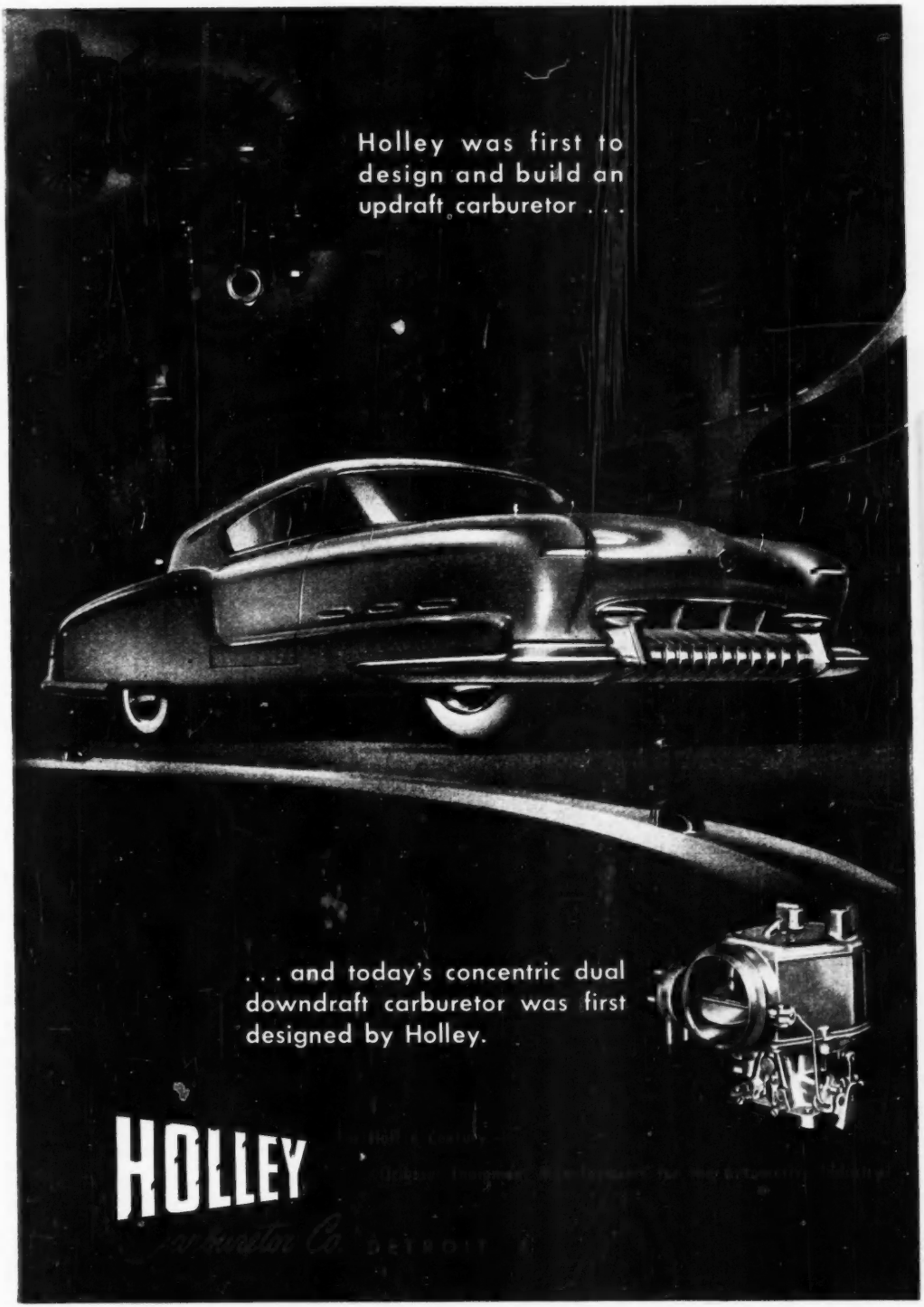


Mayari R is produced in sheets, strip, plates, bars, structural shapes, and cold-formed shapes.

Comparatively low cost

The initial cost of Mayari R is little more than that of carbon steel. This difference is frequently offset by savings in deadweight and maintenance.

Mayari R *makes it lighter... stronger... longer lasting*


Holley was first to design and build an updraft carburetor . . .
. . . and today's concentric dual downdraft carburetor was first designed by Holley.
HOLLEY

VANADIUM

FOR WELDABILITY

WRITE US FOR DATA ON THE SUPERIOR
WELDING PROPERTIES OF VANADIUM STEELS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • PITTSBURGH • CHICAGO • DETROIT • CLEVELAND

MAKERS OF FERRO-ALLOYS

CHEMICALS AND METALS

Be smart about your business . . . demand uniforms of

REEVES QUALITY FABRICS

Beyond compare for smart good looks and longer wear, Reeves Fabrics have what it takes to stand up under the punishment of repeated launderings . . . and still look fresh and crisp. For these Reeves Fabrics are made from carefully selected long-staple cotton . . . combed . . . Sanforized* . . . and vat-dyed in colors that are fast to sun, water and perspiration.

You benefit three ways. Smart looking uniforms boost employee morale . . . increase customer good will. Longer-wearing uniforms mean greater savings because they spread first costs.

Look for the Reeves Fabric Label — it's your sign of uniforms and work clothes that "mean business." Write today for complete information concerning your industry.

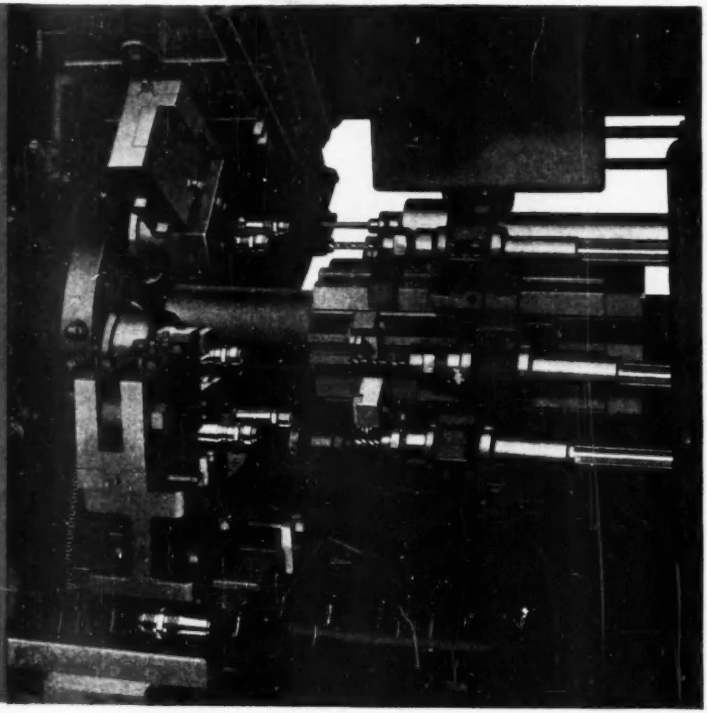
Residual shrinkage less than 1%

"FROM COTTON TO CUTTER"

REEVES BROTHERS, INC.

54 WORTH STREET, NEW YORK 13, N. Y.

REPRESENTATIVES IN: *Akron • Atlanta • Boston • Chicago • Dallas • Los Angeles • Philadelphia • Portland, Oregon • St. Louis • Montreal • Toronto*



JOB FACTS

PART: Speedometer Fitting

MATERIAL: B-1113 Steel

OPERATIONS: 14

MACHINING TIME: 23.6 Seconds, Complete

MACHINE: Acme-Gridley 1¼" RA-6 Spindle Bar Automatic

COST-CUTTING COMBINATION:

—One Machine Instead of Two
—Output Increased 16%

Fourteen operations in 23.6 seconds! That's the kind of timesaving production you get on modern Acme-Gridley Automatic bar machines.

You'll make other savings, too—in machines, man hours and overhead. Acme-Gridleys are designed to take a wide variety of cut-combining, power-driven auxiliaries that "up" production per machine.

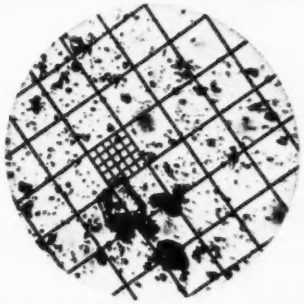
Take the job illustrated: the fourteen required operations formerly were done on two machines, the first seven on one, the remainder on the second. By arranging the tooling to include rolling the smaller of the two threads, the piece is now finished *on one machine* (a modern Acme-Gridley Automatic) and at a gain in output of 16%.

The particular job may not be applicable in your shop *but the basic principle—that Acme-Gridleys cut costs—is.* May we show you how—in terms of your own specific metal-turning needs—either bar or chucking work?

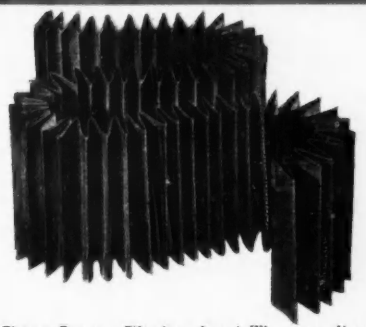
The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



Filters Micronic Particles! In tests made by the Government on oil filters, with approved Test Dust containing graded dust ranging from one micron on up, Purolator filtered 97.8% on the very first pass-through.



5 Times Greater Filtering Area! The accordion-pleated design of the Purolator Micronic Filter provides an area 5 times that of old-style filters. More than 10 feet of filtering surface in a 3⅜ inch diameter element!

4 Big Reasons Why Purolator is the favorite standard equipment oil filter!

Can't Warp, Distort, Disintegrate!—Purolator's Micronic element is made of cellulose specially impregnated with plastic. The immersion test shown above proves water dilution will not affect filter medium or flow rate.

PERCENTAGES BY WHICH PUROLATOR MICRONIC ELEMENT EXCELLED COMPETITIVE TYPES

COMPETITOR	IN AVERAGE DIRT RETENTION PUROLATOR LED BY:
A	199%
B	220%
C	113%
D	547%
E	164%
F	619%
G	255%
H	339%
I	318%
J	193%
K	237%
AVERAGE PUROLATOR SUPERIORITY	290%

Removes 200% More Abrasives! In competitive tests against comparable filters . . . Purolator led in average dirt retention by 290% (as shown above) because Purolator filters particles measured in microns (.000039 of an inch) and has greater filtering area.

To create additional acceptance for your engines and vehicles, equip them with the most efficient oil filter . . . the Purolator Micronic Filter.

Purolator not only protects engines by removing *all* the sludge, *all* the abrasives . . . it also *leaves* in the oil any additives placed there by the refinery for greater lubrication efficiency. Other types of filters often remove these additives.

Write for further information. And be sure to contact Purolator's highly experienced engineering staff about your *special* filtering problem.

PUROLATOR PRODUCTS INC.

Newark 2, New Jersey and Windsor, Ontario, Canada

PUROLATOR

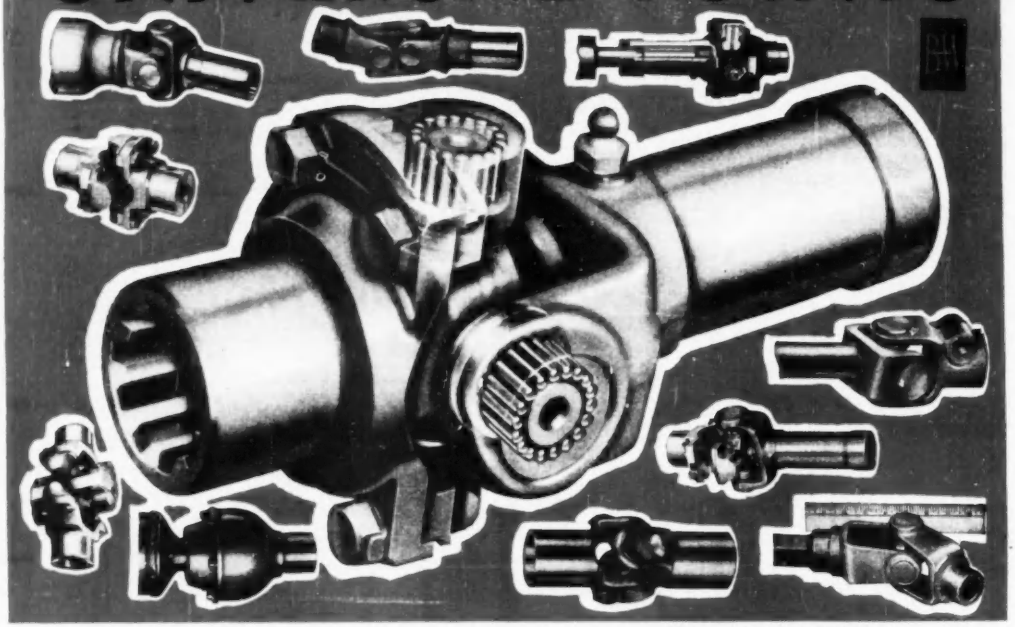
MICRONIC OIL FILTER

"FIRST IN THE FIELD OF FILTERING"

MECHANICS

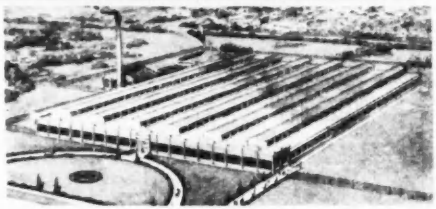
Roller Bearing

UNIVERSAL JOINTS

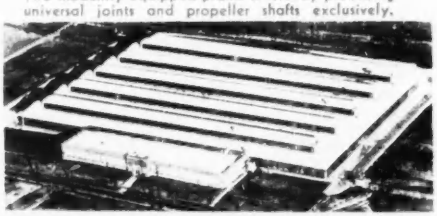


- with 40 Years Experience

Back of every MECHANICS Roller Bearing UNIVERSAL JOINTS application is over 40 years of experience designing, building, applying and servicing universal joints — for millions of cars, trucks, tractors, farm implements, road machines and industrial equipment. A complete engineering service and two huge factories, using the most modern and efficient equipment, are available to help improve the propeller shaft units in your product. Our new catalog — showing the complete line of MECHANICS Roller Bearing UNIVERSAL JOINTS and PROPELLER SHAFTS — will be sent to manufacturers, upon request.

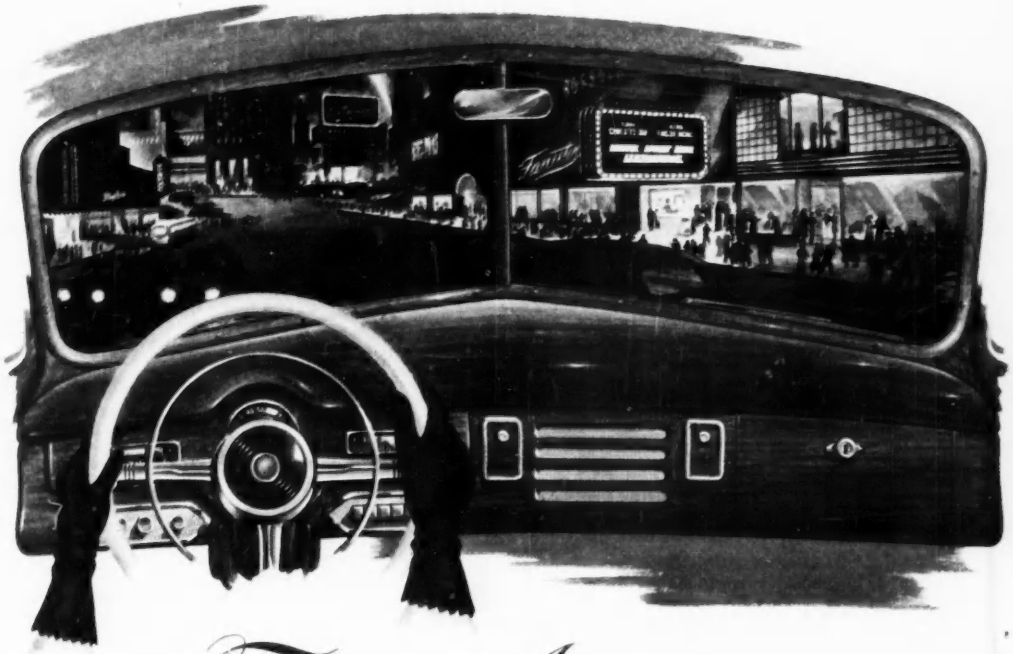


Two modernly equipped plants efficiently producing universal joints and propeller shafts exclusively.



MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Ave., Rockford, Ill.



Feature Attraction . . .

● There's always a "good show" on for folks in the front seat of a car equipped with an instrument panel that's been wood-grained by Motor Products. The reason? Such an instrument panel's richly attractive beauty makes it the feature attraction of any car's interior.

What's more, because the instrument panel is a focal point of interest to every new car buyer, automotive manufacturers demand that it possess outstanding eye-appeal.

* * * *

Long experience in the metal finishing field, and in the highly specialized application of wood-graining to window moldings, glove compartment doors, and other formed metal parts, has equipped Motor Products for the role of leader in this field. Consult us . . . without obligation.

MOTOR PRODUCTS CORPORATION

11801 Mack Avenue • Detroit 14, Michigan

In Refrigerators, too

MALLORY SILVER CONTACTS

Play a vital role in that "taken-for-granted" service

For every kind of contact material and service, Mallory is your best source.

Today refrigerators are so trouble-free that many years of service are the accepted rule. It takes a lot to offer these broad guarantees—and not the least are the Mallory Silver Contacts so many refrigerator manufacturers specify for use in temperature controls and motor starting units.

They are SURE of Mallory Quality.

For conditions requiring high electrical and heat conductivity Mallory Fine Silver Contact material is without equal.

If you require a relatively low contact resistance but greater hardness, Mallory Coin Silver is ideal. There are many other silver alloys serving a wide variety of applications.

What's Your Problem?

Mallory makes all kinds of contacts—all the way from the giant ones used at Grand Coulee to tiny thermostatic controls. Mallory's line of contacts is so comprehensive that even the most unusual problems can often be solved by a standard Mallory Contact.

But if your problem is so unique that it can't be met by an existing Mallory Contact, Mallory engineers are prepared to develop the precise contacts you need. Consult them now.

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario.

Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors	Rectifiers
Contacts	Switches
Controls	Vibrators

Power Supplies

Resistance Welding Materials

MIDLAND'S *Complete Packaged* AIR BRAKE KITS

With 7.3 Cu. Ft. Compressors

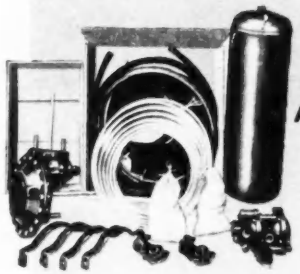
Available for all popular makes and models. Field installations—everything furnished to make a complete installation. Instructions and installation diagram in each kit.

AIR BRAKE KIT

For Tractor Installation order:

- *STRAIGHT TRUCK KIT*
- *TRACTOR TO TRAILER OUTLET KIT*
- *AIR HAND CONTROL VALVE KIT*
- *AIR HORN KIT (SINGLE OR DUAL)*

Also Available: AIR CONVERSION VALVE KIT.
10 CU. FT. COMPRESSOR.



TRAILER AIR BRAKE KIT

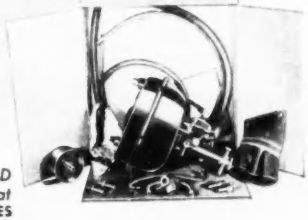
VACUUM BRAKE KITS . . .

For all makes and models from ½ ton up. Contain Midland's HY-POWER units. Furnished in sizes to suit the vehicle.

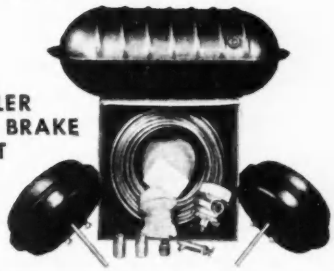
- *STRAIGHT TRUCK KIT*
- *TRACTOR TO TRAILER OUTLET KIT*
- *VACUUM HAND CONTROL VALVE KIT*
- *SYNCHRONIZING VALVE KIT*

THE MIDLAND STEEL PRODUCTS CO.
6660 Mt. Elliott Avenue • Detroit 11, Mich.
Export Department: 38 Pearl St., New York, N. Y.

HY-POWER VACUUM BRAKE KIT



TRAILER VACUUM BRAKE KIT



See Your Nearest MIDLAND Authorized Distributor or Branch at
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6105 E. CLAY ST., PORTLAND, ORE.

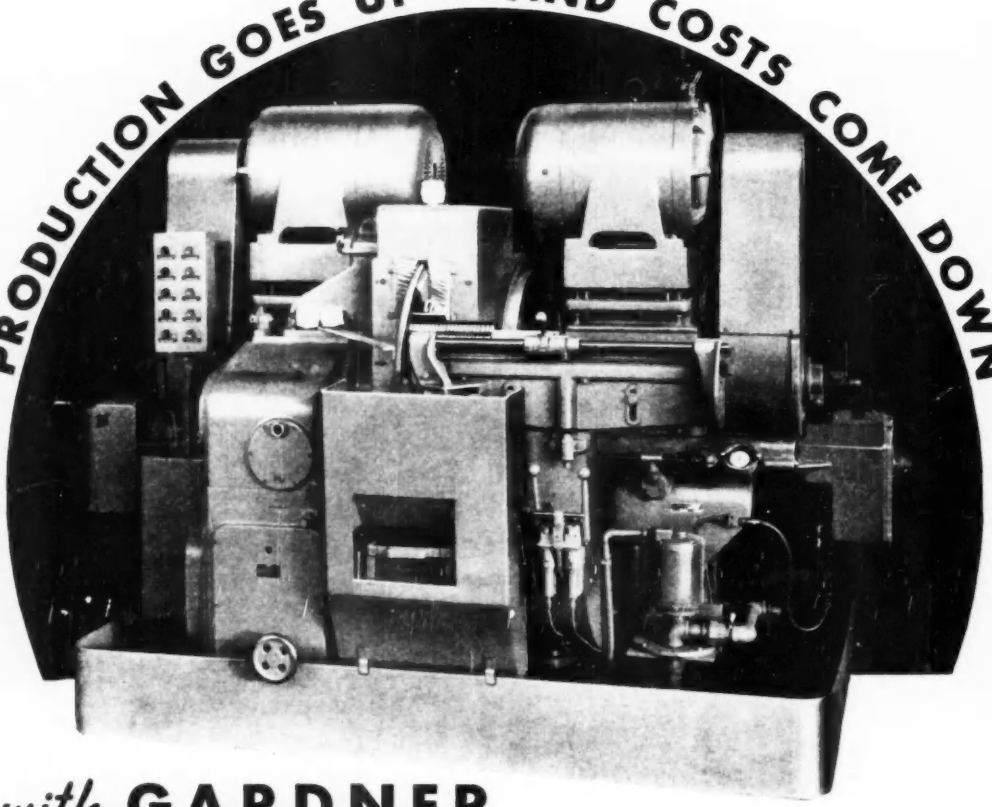
MIDLAND

POWER BRAKES

AUTOMOBILE AND TRUCK FRAMES

BUS DOOR CONTROLS

PRODUCTION GOES UP — AND COSTS COME DOWN



with GARDNER *Double* GRINDING!

NOW, when the buyer's market is demanding "more for less", GARDNER *Double* GRINDING is a practical solution.

In the example shown above, TWO faces of cast iron pump covers are ground at ONE time, on a semi-automatic GARDNER GRINDER — doubling production, while cutting labor costs in half. Extremely close tolerances are maintained, too.

GARDNER *Double* GRINDING is producing more and better parallel-surfacing, for less cost, in hundreds of plants. Let our engineers prove how it can do this for YOU.

WORK DATA

Part: Pump Cover
Material: Cast Iron
Operation: Grind Two Sides
Tolerances: .0005"-.001" for Flatness; .001" to .0015" for Parallelism; .010 for Uniformity
Stock Removal: .040" to .050" Maximum Overall
Production: 12 to 15 Pieces per Minute
Feed: Hand Load to Through-type Feeder, Automatic Unload
Machine: No. 125-26" Gardner Double Grinder

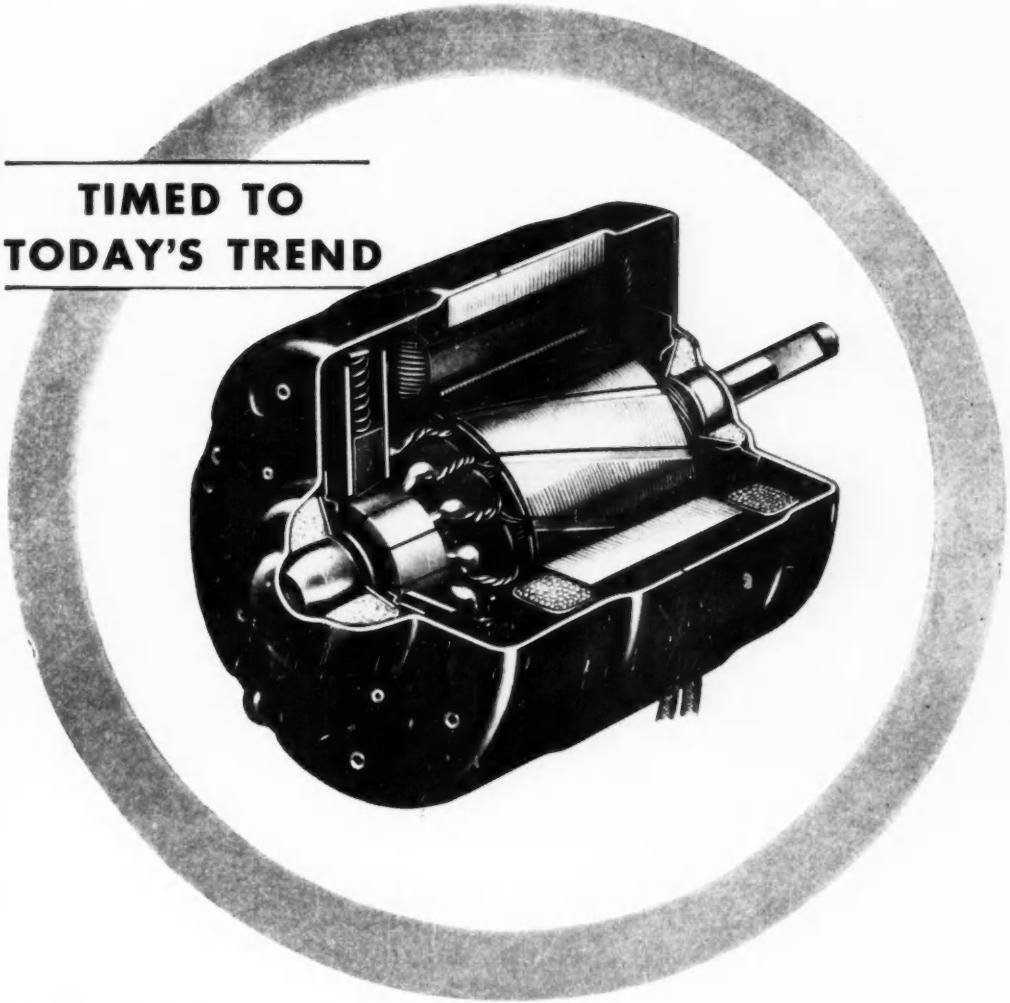
Write for Bulletin on Gardner Double Grinding!

GARDNER-GRIND YOUR *Flat* SURFACES

GARDNER MACHINE COMPANY

444 East Gardner Street • • • • Beloit, Wisconsin, U.S.A.

TIMED TO TODAY'S TREND



Redmond 1/10th HP DC MICROMOTOR

UP TO ⅓rd HP ON INTERMITTENT DUTY

It's in line with the latest trend in the automotive industry toward larger heating, ventilating and defrosting units. It's ideal for electro-mechanical and electro-hydraulic devices.

Scientifically chamfered field pole design, cushion mounted armatures and pre-seated brushes provide smooth, quiet operation. Large oil reservoirs and direct feed lubrication assure long life. Self-centering bearings are individually fitted to the shaft, and a strong steel case protects the mechanism and maintains alignment.

Here you get tested efficiency and long life, a product backed by the reputation of millions of lower power Redmond direct current Micromotors that have given years of top performance under rugged conditions all over the world.

Write for full information today.

Redmond COMPANY, INC.

OWOSSO, MICHIGAN

Expanded Facilities • Prompt Deliveries • Service before and beyond the sale

REDMOND

These Inlite linings will give 2000 cars

Identical Braking Service

To make brake linings work right from first to long last...

THAT'S THE PROBLEM!

Inland solves that problem with Inlite Brake Linings! They're not *stock* linings . . . *pretty* good on any vehicle. They're *special* linings . . . for the particular car, model and wheel.

Inlite starts with special compounds of asbestos fibers, binding resins and filler materials. All of them, especially the binders, are very highly heat-resistant. And the *right controlled* pressure . . . not merely *high* pressure . . . is used to produce the exact desired density.

The whole production process . . . always for the particular vehicle and wheel, remember . . . is under constant and meticulous laboratory control. Any segment in any lot of Inlite will test out . . . as proven at the General Motors Proving Grounds . . . to required performance specifications.

So in actual service, here's what happens. Inlite gives smooth, positive, balanced-friction, straight-line stops . . . beginning with the first one. It gives fade-proof, chatter-free, remarkably quiet braking. Heavy grades and extremely hot or wet weather have little effect on frictional performance. Finally, this performance is *uniform*, from the *first* mile to the *last*, with every set of Inlite Brake Linings . . . in *very long-lived service*.

A General Motors Product

UNITED SERVICE MOTORS

A UNITED MOTORS LINE

Available Everywhere Through United Motor Service Distributors

INLITE
Brake Linings

INLAND MANUFACTURING DIVISION • *General Motors Corporation* • DAYTON, OHIO

Quick
Casting Service
(coast to coast)
What's your yardstick for buying castings? MODERN FOUNDRIES . . . Alcoa has them . . . from coast to coast. PRODUCTION EQUIPMENT . . . Alcoa's automatic equipment makes more and better castings for your dollar. EXPERIENCED PERSONNEL . . . Alcoa old-timers, experts in light metal casting, give you extra quality learned from 20 to 30 years in the business. TECHNICAL ABILITY . . . Alcoa outclasses all others with 61 years of aluminum experience. DELIVERY . . . your nearby Alcoa sales office offers prompt quotations and fast deliveries of the world's best sand and permanent-mold castings in aluminum. ALUMINUM COMPANY OF AMERICA, 2110M Gulf Bldg., Pittsburgh 19, Pa.
MISSING A CHANCE TO IMPROVE YOUR PRODUCT? Alcoa Aluminum castings offer high strength, half the weight, easy machining, corrosion resistance.
ALUMINUM CASTINGS by ALCOA
ALCOA
ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

The CRANKSHAFT is probably the most important single part in the modern high-speed, high-compression, internal-combustion engine.

Wyman-Gordon—specialists in the design and forging of crankshafts since the start of the automotive industry—furnished the first heat-treated crankshaft, forged the first six-throw crankshaft, forged the first eight-throw crankshaft, forged the first crankshaft with integral counterweights. In automotive crankshafts and in all types of aircraft forgings, steel and light alloy, there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

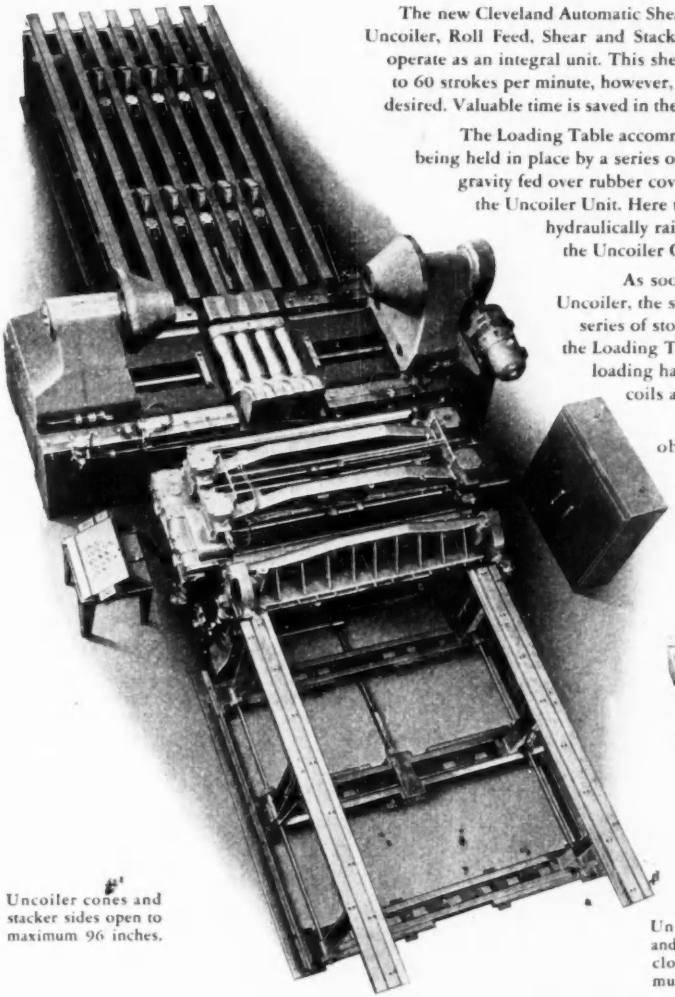
WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - - DETROIT, MICHIGAN

New CLEVELAND AUTOMATIC SHEAR eliminates costly setup time



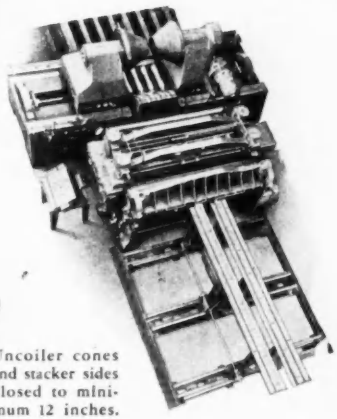
Uncoiler cones and stacker sides open to maximum 96 inches.

The new Cleveland Automatic Shear combines Loading Table, Automatic Uncoiler, Roll Feed, Shear and Stacker. These units are synchronized and operate as an integral unit. This shear is designed to operate at a speed up to 60 strokes per minute, however, this rate varies with length of material desired. Valuable time is saved in the automatic operation of this new shear.

The Loading Table accommodates two 20 ton coils at a time, each being held in place by a series of stops. As the first coil is released it is gravity fed over rubber covered rails until arrested by the stops in the Uncoiler Unit. Here the coil is resting on an elevator and is hydraulically raised until centered opposite the ends of the Uncoiler Cones.

As soon as the first coil is positioned on the Uncoiler, the second coil can be advanced to the next series of stops. Another coil can now be placed on the Loading Table at any convenient time. Automatic loading has eliminated waste time involved when coils are placed directly on the Uncoiler.

Investigate the savings that you can obtain through the operation of this shear. Various sizes and capacities can be furnished to your specifications. Complete information will be forwarded at your request.



Uncoiler cones and stacker sides closed to minimum 12 inches.

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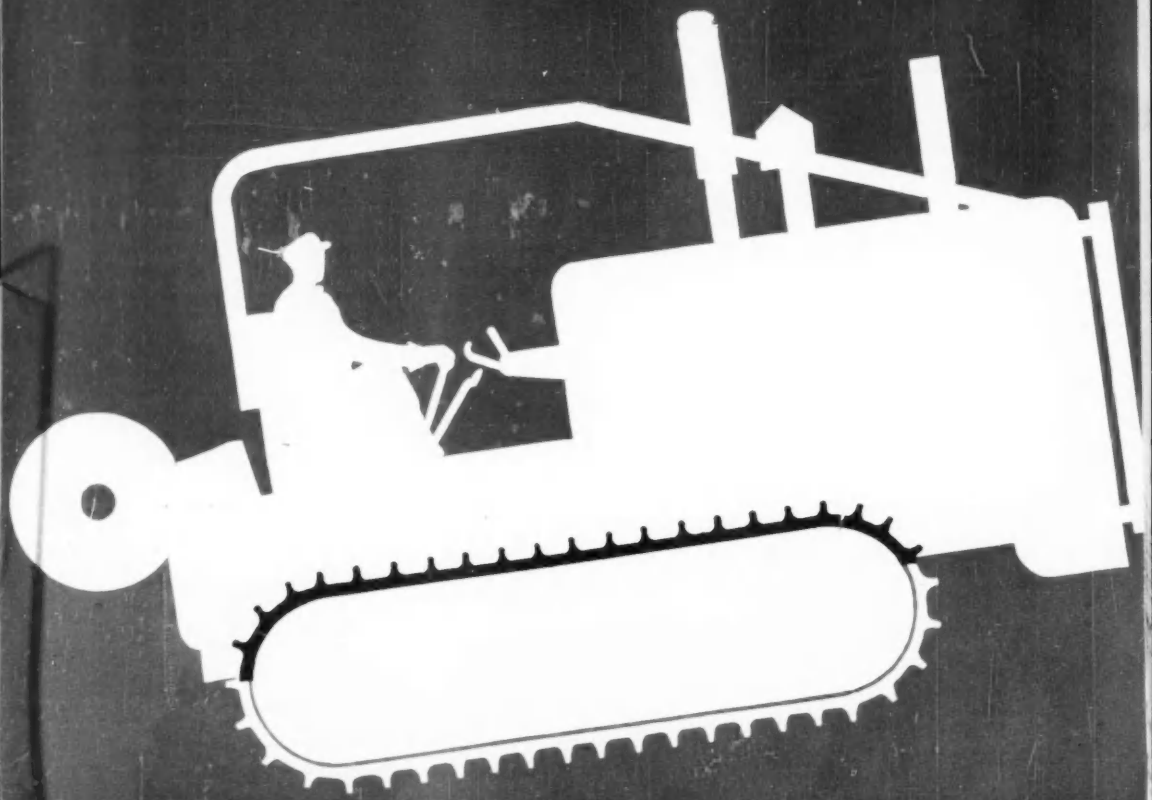

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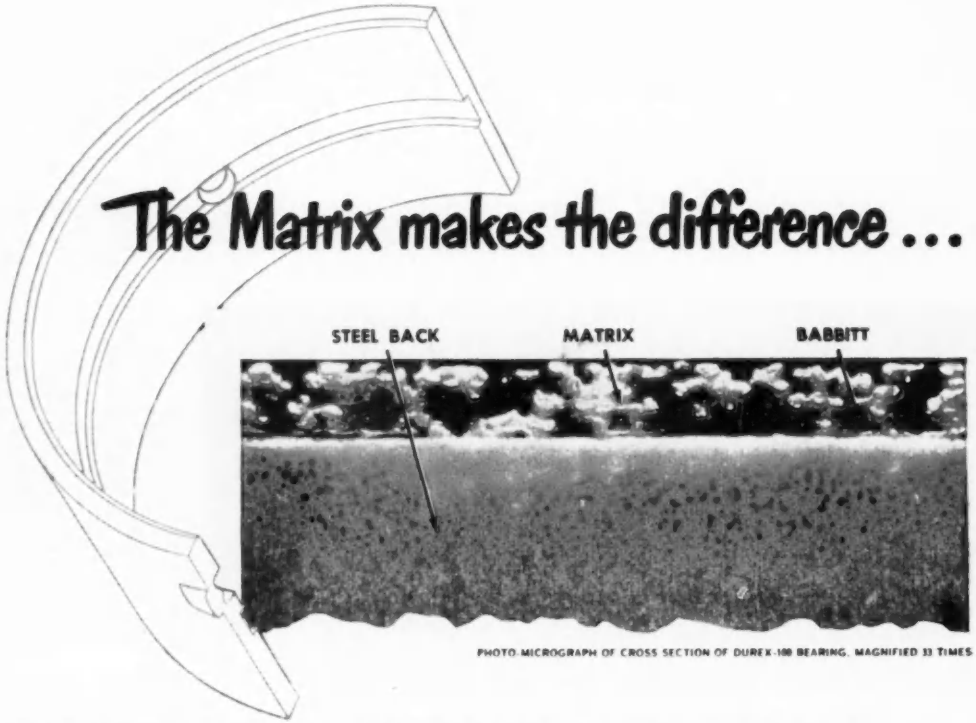

PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING, MAGNIFIED 33 TIMES

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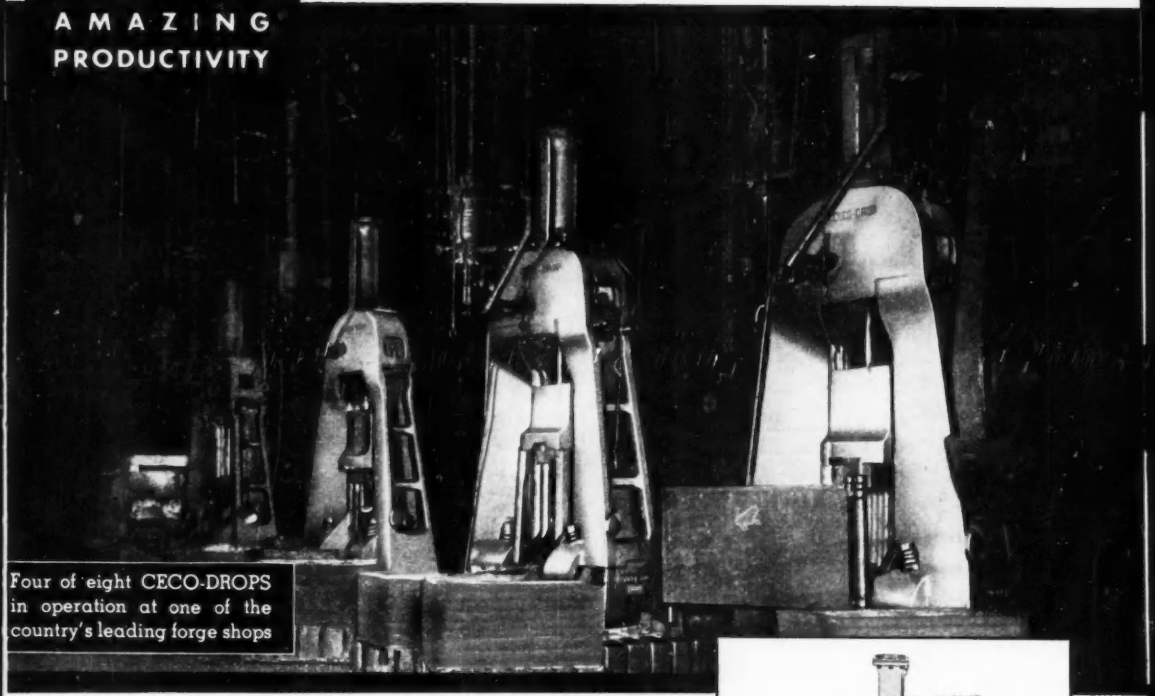

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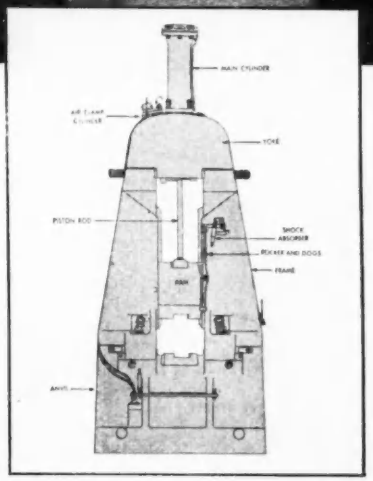

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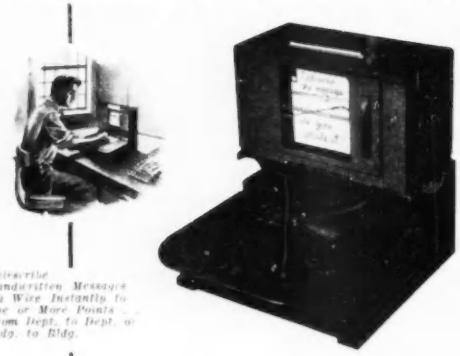

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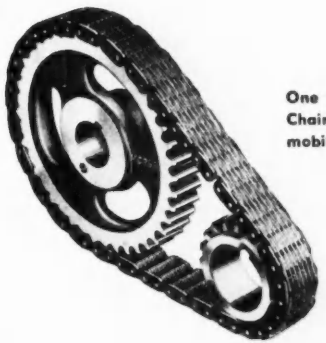

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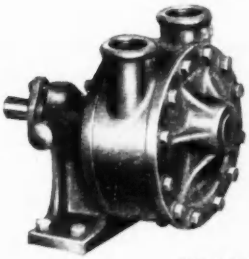

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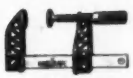

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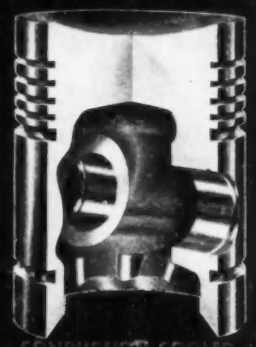

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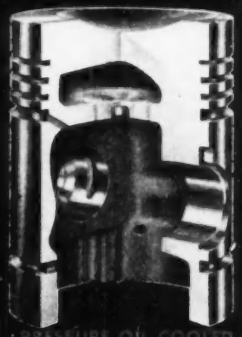

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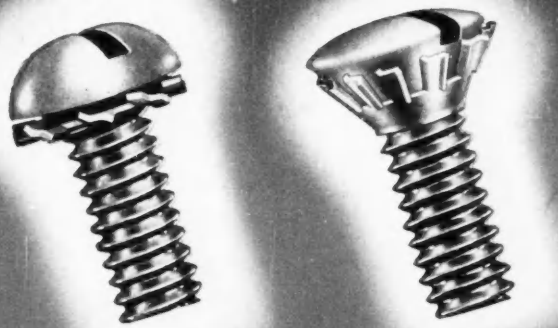

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